The RUBBER AGE

March, 1948

the NEW LOOK

For RUBBER Products

(Tires—Belting—Hose—Sponge—Molded Goods—etc.)

with

VANWAX

CLEAR or BLACK

2000-3000 SQ. FT. OF SALES APPEAL PER GALLON

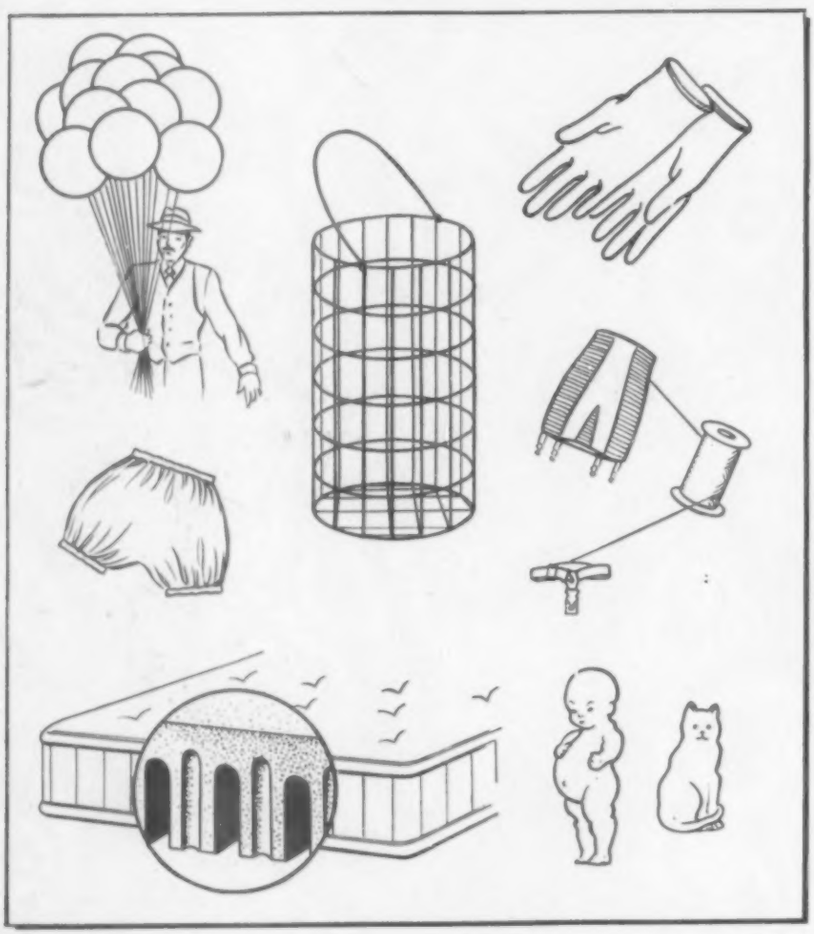
For detailed information see the VANDERBILT NEWS, Vol. 14, No. 1, p. 6

R. T. VANDERBILT CO. INC.

230 Park Avenue, New York 17, N. Y.

ZENITE-TETRONE A

offers outstanding advantages as an accelerator combination in natural latex



FAST CURING

Tight cures may be obtained in 30 minutes at 212° F.—effective at 150° F. or higher.

GOOD AGING

Produces good aging latex films suitable for many applications, even without added antioxidant.

MINIMUM PRE-CURING

Storage periods up to 10 days at 80° F. are practical for most compounds.

NON-DISCOLORING

Does not add to the normal discoloration caused by rubber itself even upon exposure to sunlight.

NON-STAINING

Under normal service conditions pyroxylin finishes, as well as most other finishes, are not stained by Zenite-Tetrone A acceleration.

STABLE

Does not adversely affect mechanical stability of compounded latex.

Tune in to Du Pont "Cavalcade of America," Monday Nights—8 p. m. EST, NBC

For more complete information . . .

on Zenite-Tetrone A acceleration for natural rubber latex, write to:

E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division, Wilmington 98, Delaware.

DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

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PUBLIC LIBRARY
MAR 24 1948
DETROIT

TWO NEW HYCAR AMERICAN RUBBERS

Hycar OR-25 EP *(Easy Processing)*
Hycar OR-25 NS *(Non-Staining)*

HERE are two new American rubbers, both with superior processing characteristics. Hycar NS and Hycar EP differ only in that a special anti-oxidant has been used in the NS, making it non-staining and non-discoloring. This is an outstanding quality, particularly desirable in the fabrication of light colored products. The new Hycar rubbers have all these advantages over the regular process Hycar OR-25:

1. They band on the processing mill speedily—cut mill mixing time.
2. Better extrusion characteristics—less nerve and less heat build-up.
3. Excellent high temperature mixing.
4. Better fusion and mold flow characteristics.
5. Increased building tack for laminated products, such as frictioned stocks and calendered sheeting.

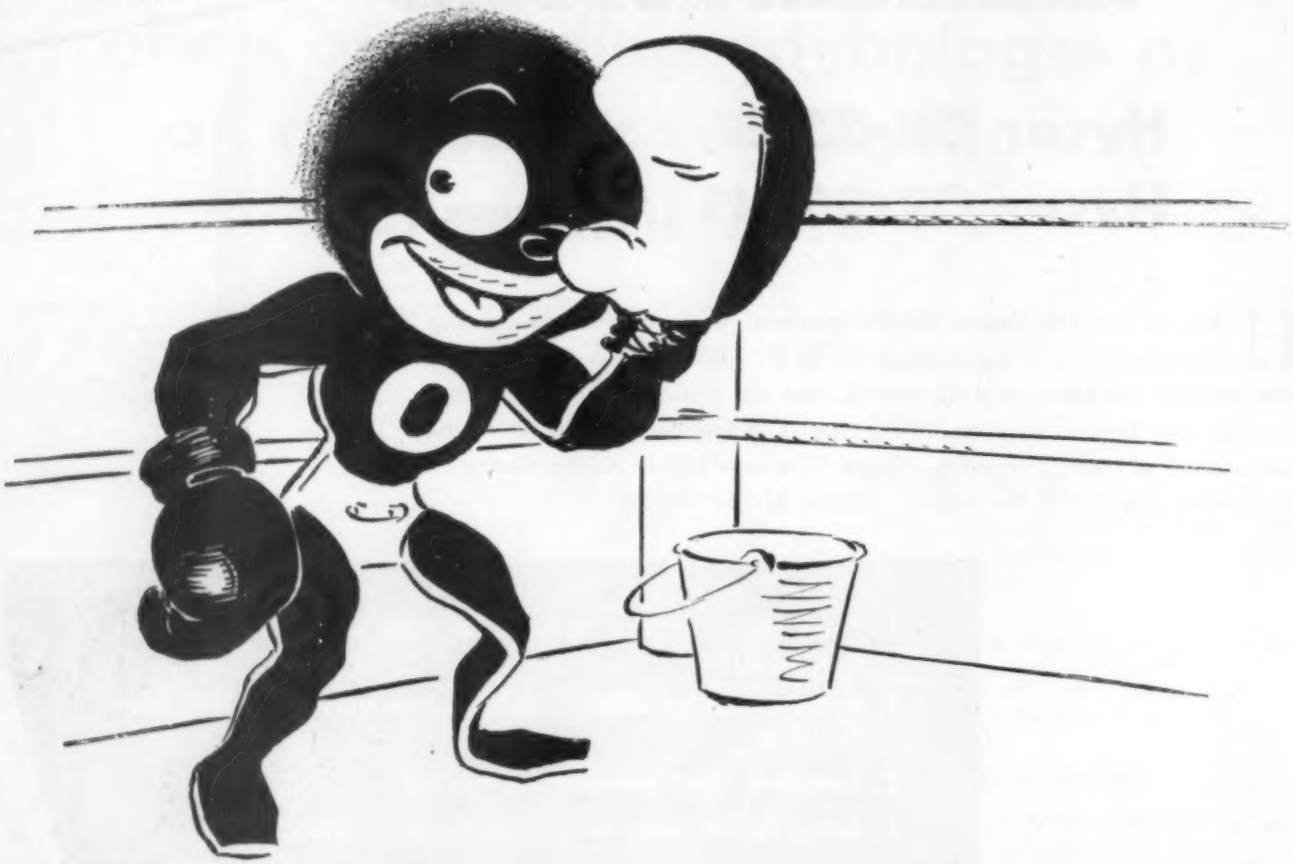
Both rubbers retain those properties which make Hycar American rubbers so usable for so many products . . . permanent resiliency and superior resistance to oil, abrasion, and aging. Ask your supplier for parts made from Hycar. Or write to Dept. HB-3, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

Hycar
Reg. U. S. Pat. Off.
American Rubber

B. F. Goodrich Chemical Company
A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

PHILBLACK O



CHALLENGES ALL COMERS!

We're betting on this new **HAF** (High Abrasion Furnace) black to win easily—against all challengers. Philblack O packs a wallop in either hand—superior abrasion resistance and extremely long flex-life. This aggressive one-two punch is backed up by a rugged defense against cut and crack growth, and resilience to stay in there and take it when the going's tough.

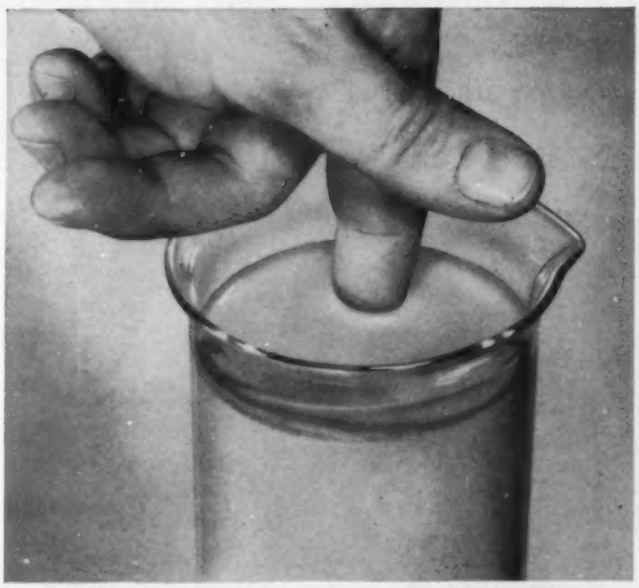
But you've got to see Philblack O in action to appreciate just how good he really is. Send for a trial order and give this "Black Wonder" a workout. Pit him against any other black in his class and see what splendid qualities Philblack O imparts to rubber products. High abrasion resistance, long flex-life, good resilience and, in addition, high tensile strength, even at elevated temperatures.

We think you'll find that Philblack O will win by a knock-out!

PHILLIPS PETROLEUM COMPANY

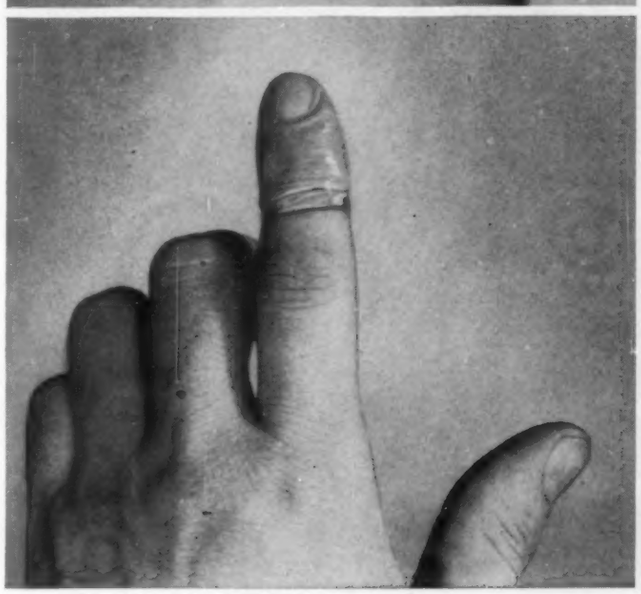
Rubber Chemicals Division

EVANS SAVINGS AND LOAN BUILDING · AKRON 8, OHIO



Hot air not needed

A new Geon latex film-forming at room temperatures



THE man has just dipped his finger into a new Geon water-borne resin known as Geon Latex 31X. It will dry on his finger, in the air, at ordinary room temperature, rapidly and evenly.

If you package foods or deal in fresh fruits and vegetables . . . or if you're looking for a better adhesive . . . or want to make a water paint with a water-impervious film that will dry at simple room temperature . . . or if you're dipping toys, gloves, packages, etc., where the form has a complicated shape and a thin flexible wall or covering is required—you'll want to know more about Geon Latex 31X.

The deposited film is flexible, but contains no plasticizer. It is odorless, resistant to grease, and has low moisture vapor transmission. It won't support a flame. Adheres readily to paper, wood, fiberglas, and textiles.

A distinct advance, a cost-cutter, a product-improver, you will agree—and we'll be glad to send our special bulletin giving complete details. We make no finished products from Geon Latex 31X or any of our other raw materials. We are interested, however, in any problems or special applications. For the special bulletin, please write to Department R-3, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

Good-rite
VULTROL
for use in American rubber compounding
to prevent scorching, and for recovering
scorched stocks
GOOD-RITE AND VULTROL REG T M U S PAT OFF

For technical data please write Dept. CB-3

B. F. Goodrich Chemical Company

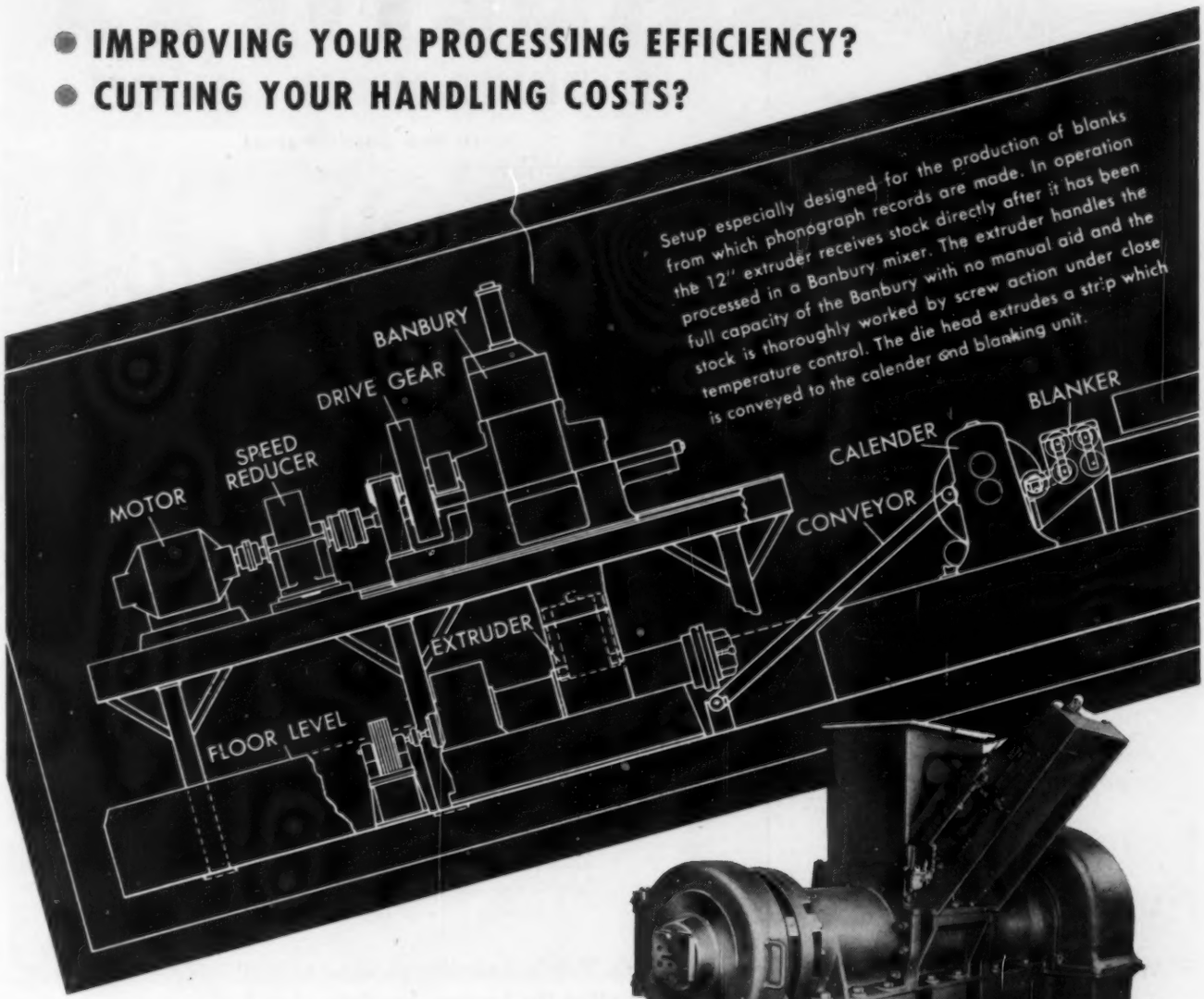
A DIVISION OF THE B. F. GOODRICH COMPANY

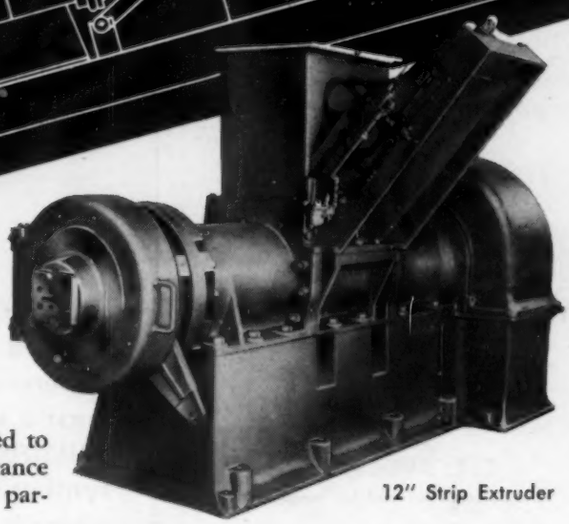
ROSE BUILDING, CLEVELAND 15, OHIO

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

Does this layout give you an idea for

- **IMPROVING YOUR PROCESSING EFFICIENCY?**
- **CUTTING YOUR HANDLING COSTS?**


Setup especially designed for the production of blanks from which phonograph records are made. In operation the 12" extruder receives stock directly after it has been processed in a Banbury mixer. The extruder handles the full capacity of the Banbury with no manual aid and the stock is thoroughly worked by screw action under close temperature control. The die head extrudes a strip which is conveyed to the calender and blanking unit.
BANBURY
DRIVE GEAR
SPEED REDUCER
MOTOR
CALENDER
BLANKER
CONVEYOR
EXTRUDER
FLOOR LEVEL



12" Strip Extruder

The special processing setup in this layout was designed to solve a specific problem for one company. Its real significance lies in the approach to the problem rather than in the particular solution.

For many years Farrel-Birmingham engineers have been called in by one company after another to formulate plans for improving the "flow" in processing rubber and plastics stocks. This layout is only one of the many successful solutions that have been worked out for specific problems.

Farrel-Birmingham engineers will be glad to discuss the possibility of improving your production efficiency and cutting your handling costs through planned processing "flow." Why not call on them? No obligation, of course. FB-435

FARREL-BIRMINGHAM COMPANY, INC. · ANSONIA, CONNECTICUT

Plants: Ansonia, and Derby, Conn., Buffalo, N. Y. *Sales Offices:* Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston

Farrel-Birmingham

ALKALI

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301 South Compress

OMAHA 2, NEBRASKA
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12 South 12th Street

PITTSBURGH 22, PENNA.
2527 Oliver Building

ST. LOUIS 8, MISSOURI
4246 Forest Park Boulevard

WICHITA 1, KANSAS
306 West 2nd Street

California
C. L. DUNCAN CO.
San Francisco and Los Angeles

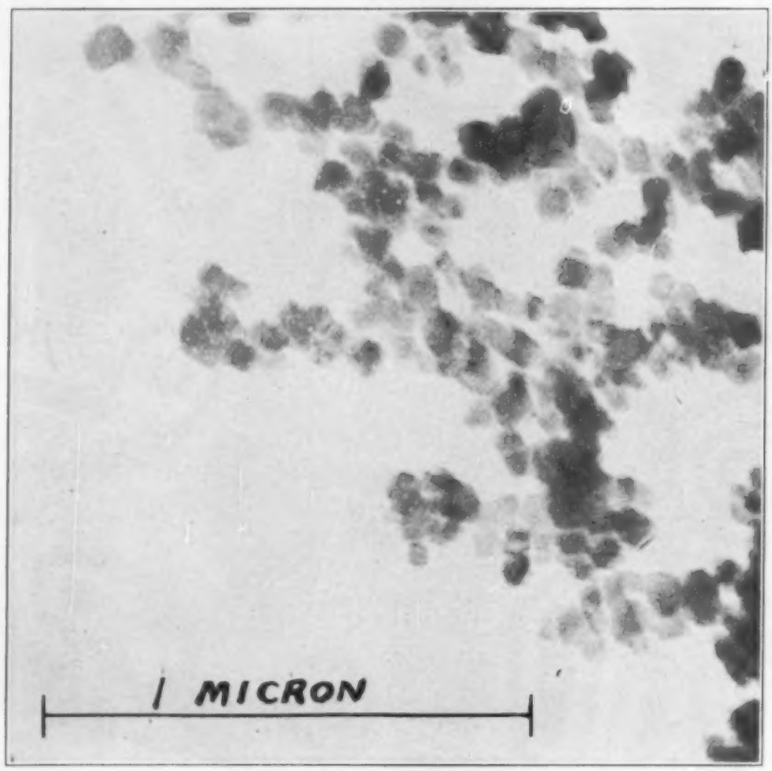
Washington and Oregon
VAN WATERS and ROGERS, INC.
Seattle and Portland

Canada
HARRISONS and CROSFIELD
(Canada) Ltd.
Montreal and Toronto

MULTIFEX

PRECIPITATED CALCIUM CARBONATE

(ultra fine particle size)



Electron microscope photograph, 60,000 diameters, shows ultra fine particle size of MULTIFEX

MULTIFEX MM is a similar product to MULTIFEX (see photo). It has a slightly larger particle size but is more easily dispersed than "regular" MULTIFEX. It gives slightly lower tensile strength and resistance to tear than "regular" MULTIFEX but is much easier to incorporate in natural or synthetic rubber, or in plastics. This is particularly true where it is impossible or impractical to employ the *master batch method* of mixing.

Samples on request

TRY MULTIFEX MM IN YOUR VINYL FLOORINGS

DIAMOND ALKALI CO.

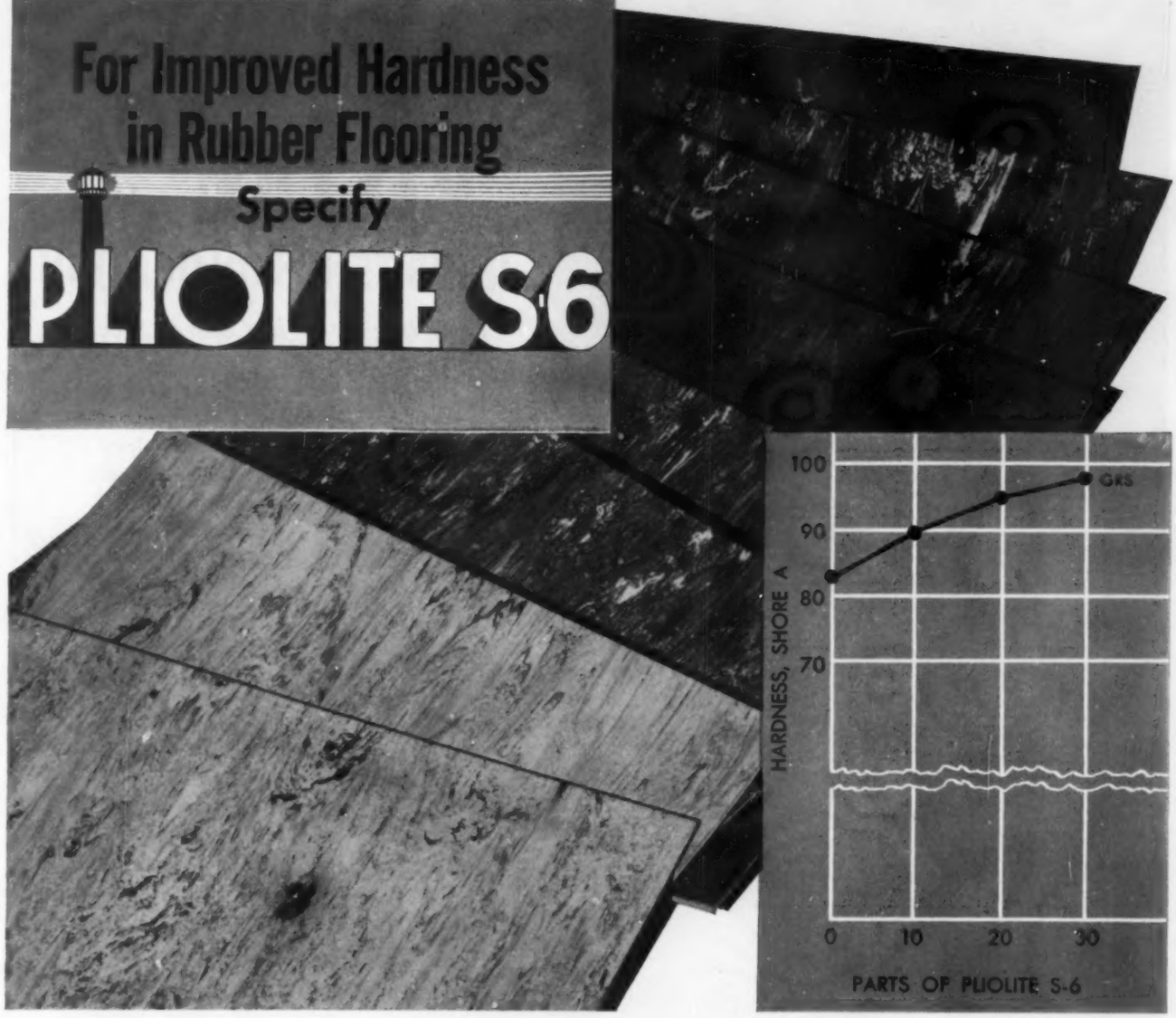
PURE CALCIUM PRODUCTS DIVISION

P. O. BOX 407, PAINESVILLE, OHIO

KALITE **SWANSDOWN BRAND** **MULTIFEX** **SUSPENSO BRAND** **MILLICAL BRAND**

For Improved Hardness in Rubber Flooring

Specify PLIOLITE S-6



RUBBER flooring must be hard and scuff- and abrasive-resistant to withstand long years of abusive service. The chart above shows how effectively loaded GRS stocks are hardened by reinforcement with **PLIOLITE S-6.**

Experience proves that when **PLIOLITE S-6** and mineral fillers are used in combination, very high hardness values can be obtained in stocks that still retain excellent toughness and durability.

Another important advantage of **PLIOLITE S-6** is the fact that it helps to eliminate scrap. It acts as a plasticizer at elevated temperatures, improving calendering and plate polishing. As the stock cools, **PLIOLITE S-6** prevents shrinkage.

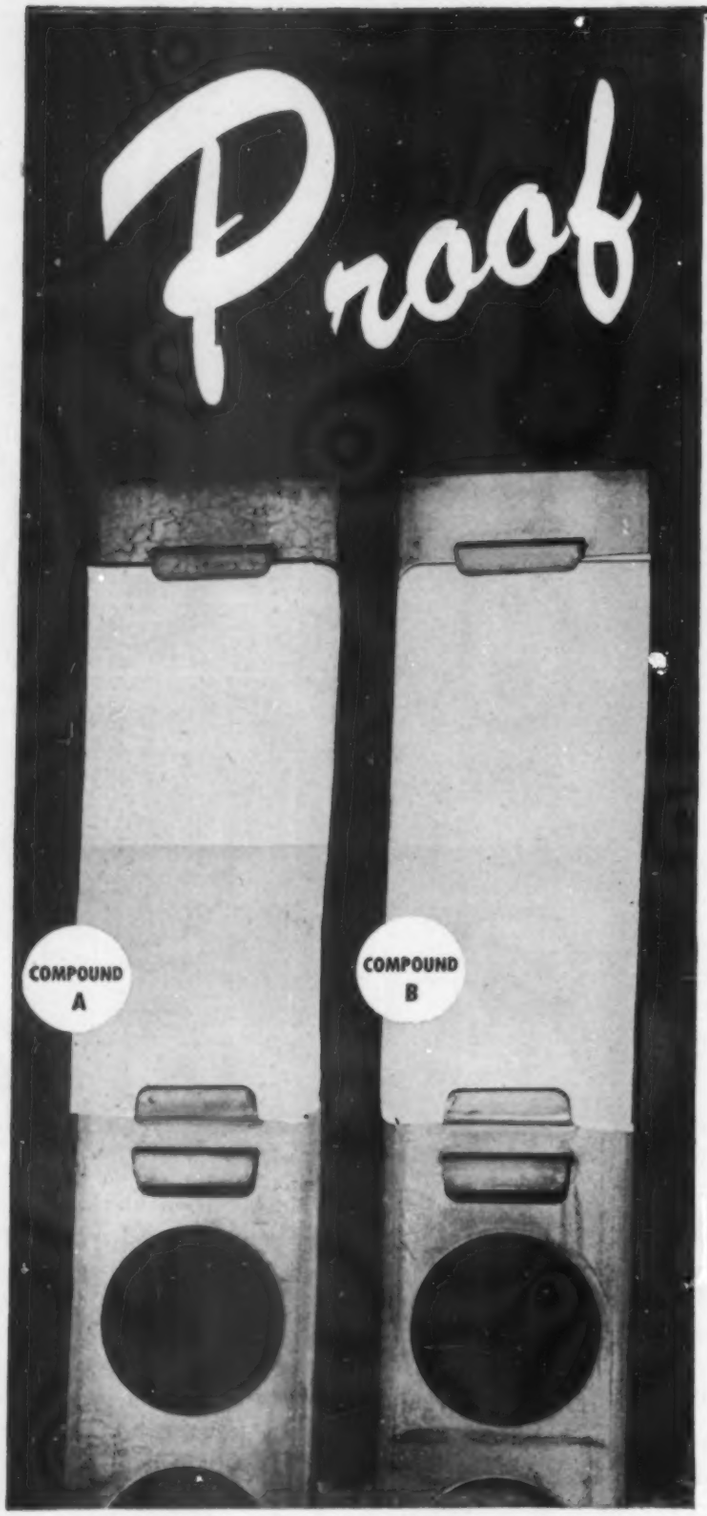
You will find **PLIOLITE S-6** well suited to all compounds needing a light-color, low-gravity stock of 70-100 durometer hardness with good processing characteristics and moldability. It is highly desirable as a substitute for carbon black, since it reinforces natural and synthetic rubbers in colored as well as black stocks.

PLIOLITE S-6 is available as a powder for your own mixing, or in master batches in whatever synthetic you select. For complete information and sample, write: Goodyear, Chemical Products Division, Plastics and Coatings Dept., Akron 16, Ohio.

GOODYEAR

1898 50 GOODYEAR ANNIVERSARY 1948

Pliolite—T. M. The Goodyear Tire & Rubber Company



Unretouched Photo

that Plasticizer

VISTAC #1

INHIBITS DISCOLORATION

In White or Light Colored Stocks

Fadeometer tests made for 44 hrs. graphically illustrate the superiority of white and light colored stocks plasticized with Vistac #1. Upper half of each sample shows original color.

COMPOUND A
Contains 1% Vistac per 100 parts rubber

COMPOUND B
Contains 3% Vistac per 100 parts rubber

Vistac #1 is non-toxic, non-staining, odorless, and does not itself discolor stocks or white enamels.

Vistac #1 is particularly recommended for

- **White Sidewalls**
- **Drug Sundries**
- **Refrigerator Gaskets**
- **Jar Ring Stocks**
- **Vacuum Seals**

Physical Properties of Vistac #1:

Specific Gravity	0.900
Pounds Per Gallon	7.5
Color	Almost Water-White
Saybolt Univ. Visc. (210°F)	2800+ secs.

Write for our new booklet on the use of
VISTAC #1 in NATURAL RUBBER and GR-S

Advance Solvents & Chemical Corp.
245 Fifth Avenue • New York 16, N. Y.

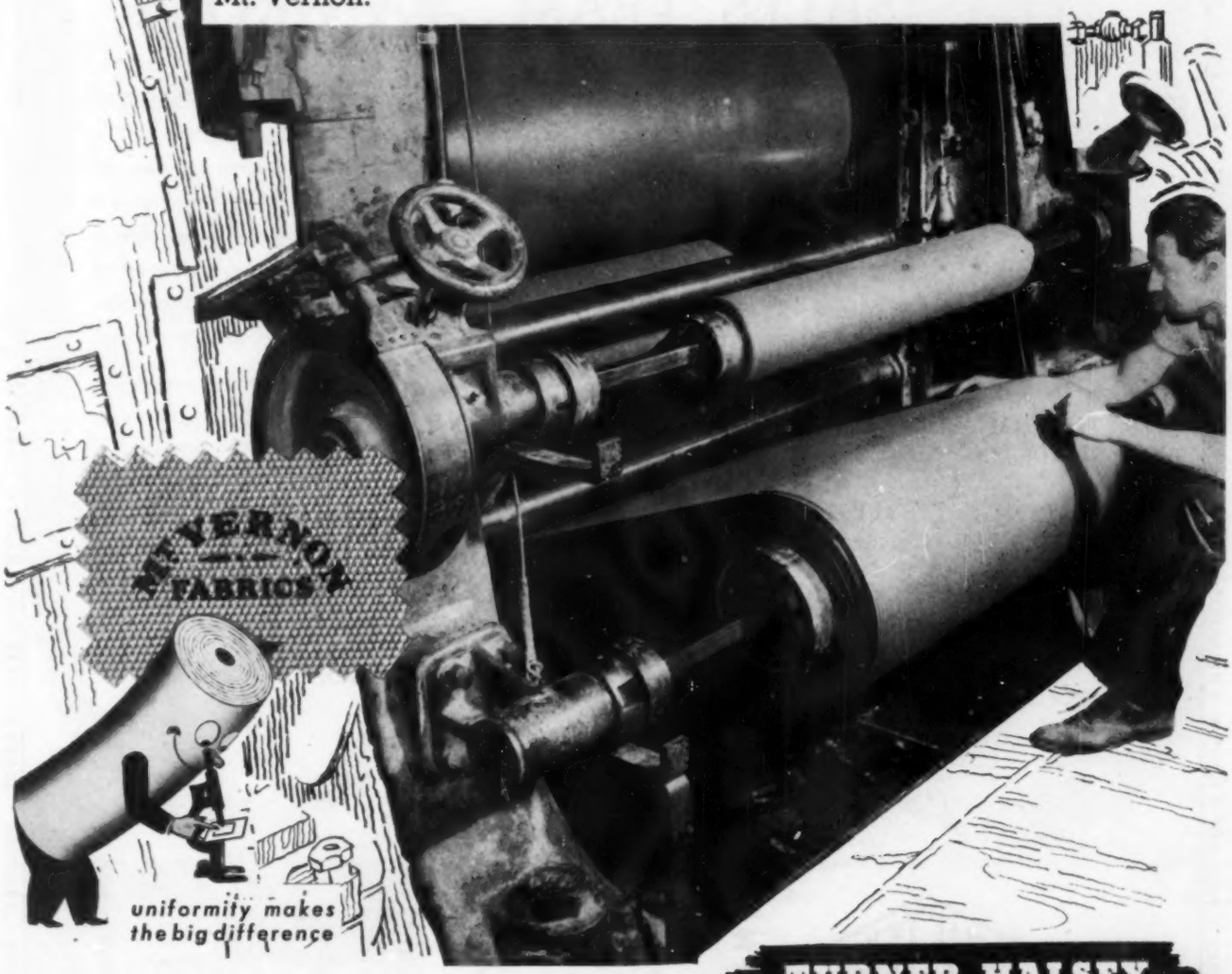
Mt. Vernon's Greater Uniformity Helps Calendering Efficiency

Uniformity of the fabrics you use means a great deal to the smooth, uninterrupted operation of your calendering machines. . . .

That's why Mt. Vernon fabrics are a favored choice wherever calendering is done. . .

Every step in the spinning and weaving of Mt. Vernon is rigidly laboratory-controlled—to insure consistently higher uniformity—to give you uniform absorption, strength, toughness, resiliency—to give you smoother, faster calendering.

For fabric quality that reflects itself in the products you make—specify Mt. Vernon.



Mt. Vernon-Woodberry Mills

TURNER HALSEY
COMPANY
Selling Agents
40 WORTH ST. • NEW YORK

Branch Offices: CHICAGO • ATLANTA • BALTIMORE • BOSTON • LOS ANGELES • AKRON

• PELLETEX • GASTEX • PELLETEX • GASTEX • PELLETEX • GASTEX • PELLETEX • GASTEX • PELLETEX • GASTEX • PELLETEX •

PELLETEX • GASTEX • PELLETEX • GASTEX • PELLETEX • GASTEX • PELLETEX • GASTEX • PELLETEX • GASTEX •

SANTICIZERS
B-16, E-15, M-17
for NON-TOXIC tubing, coatings, sheets

Where lack of toxicity is essential in a plasticizer to be used for such applications as tubing for the transfer of beer, beverages, milk and liquid foods — industry is turning more and more to the use of Monsanto Santicizers B-16, E-15 and M-17.

In addition to their non-toxicity, these glycollates impart no characteristic odor or taste. This makes them further useful in their application to can and cap liners. They are also used in hospital sheetings, acrylic dentures and similar products.

QUICK FACTS

SANTICIZER B-16 ... Compatible with most resins; imparts good flexibility and clear, brilliant films that are tough, moisture resistant, and have good weathering qualities. Especially good with vinyl resins and nitrocellulose.

SANTICIZER E-15 ... An excellent plasticizer, particularly for nitrocellulose and cellulose acetate and for most resins. Light-fast and relatively non-volatile, even from the thinnest films. With both acetyl and nitrocellulose, gives clear, tough, flexible films with greatly increased resistance to moisture penetration.

SANTICIZER M-17 ... A solvent plasticizer for vinyls and cellulosics, imparting a high degree of plasticity. Probably the best cellulose acetate plasticizer available. Insoluble in petroleum products—confers oil resistance to films in which it is used.

MORE INFORMATION ... Send for literature, technical data, samples. If you wish specific information, a letter outlining your application problems will receive prompt attention.

MONSANTO CHEMICAL COMPANY, 1700 South Second Street, St. Louis 4, Missouri. District Sales Offices: New York, Philadelphia, Chicago, Boston, Detroit, Cleveland, Cincinnati, Charlotte, Birmingham, Houston, Akron, Los Angeles, San Francisco, Seattle. In Canada: Monsanto (Canada) Limited, Montreal.

Santicizer: Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS AND PLASTICS

MONSANTO CHEMICAL COMPANY RAO-1
1700 South Second Street
St. Louis 4, Missouri

Please send me further information and technical data ☐, and samples ☐ of Santicizer Number.....

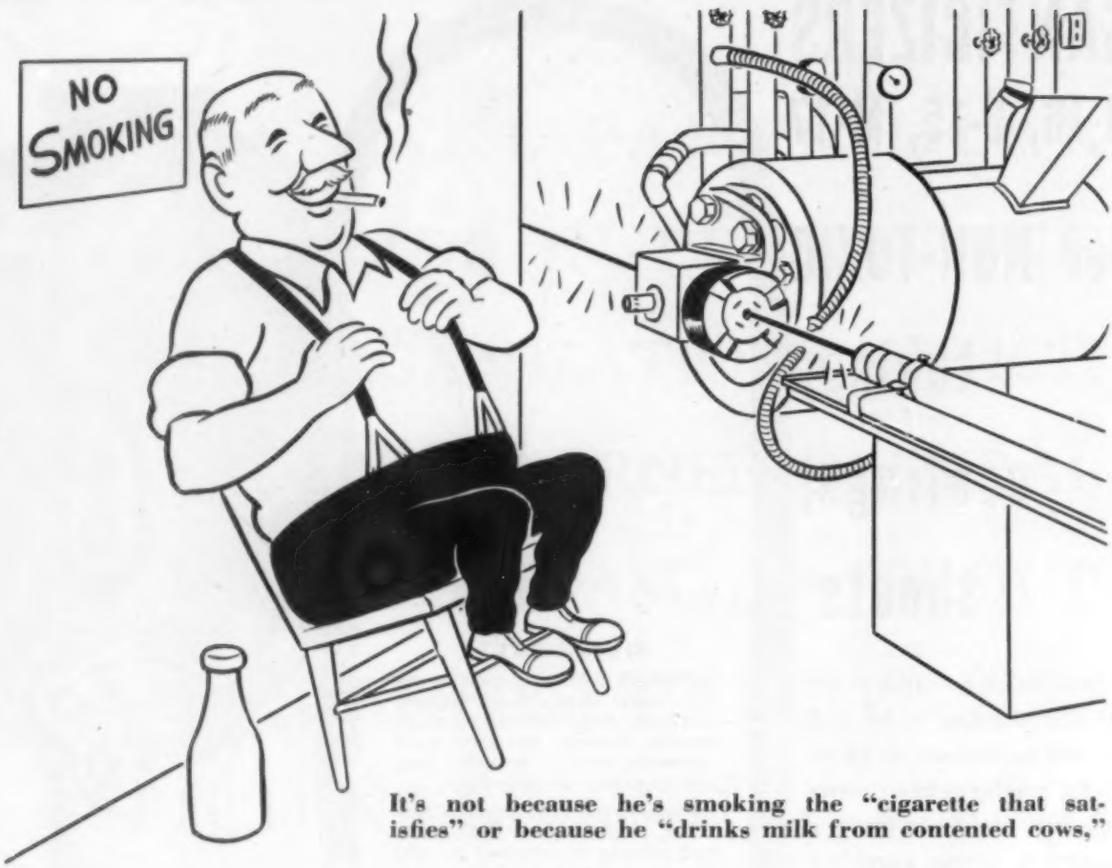
Name.....

Firm.....

Address.....

City..... State.....

SERVING INDUSTRY . . . WHICH SERVES MANKIND



It's not because he's smoking the "cigarette that satisfies" or because he "drinks milk from contented cows,"

It's because he's running insulated wire containing

PEQUANOC CALUMET

Calumet—is a neutral GRS tire reclaim. It is being successfully used in THIN-WALL CODE-WIRE INSTALLATIONS.

Formulations containing Calumet are successfully meeting all specifications.

Calumet is available only from - - -

PEQUANOC RUBBER CO.

QUALITY RECLAIMS FOR SPECIFIC PURPOSES

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HAROLD P. FULLER
203 Park Square Bldg.
Back Bay, Boston, Mass.

BURNETT & CO.
225 Lafayette St.
New York 12, N. Y.

W. T. MALONE, Jr.
General Supply & Chemical Co.,
28 Woolverton Avenue
Trenton 7, N. J.

MR. CLIMCO SAYS . . . .

CLIMCO LINERS

save time at the bias cutter and cutting table

Perfect separation of stock and liner is all important during these operations—for stock adhesions at either point cause expensive down time. You can avoid such production headaches by using Climco Processed Liners that can be readily peeled from the stock without sticking.

Climco Processing of your liners assures many other profitable advantages: Liner life is greatly increased, tackiness of the stock is preserved, and gauges are more easily maintained. Latitude in compounding is enlarged, lint and ravelings are eliminated and horizontal storage is facilitated.

Since 1922 Climco Processed Liners have proved their worth to the rubber industry. Give them a trial in your plant.

THE CLEVELAND LINER & MFG. CO.
5508 Maurice Avenue • Cleveland 4, Ohio, U. S. A.
Cable Address: "BLUELINER"

ILLUSTRATED LINER BOOKLET

Tells all about Climco Liners and Linerette and how to get better service from liners. Write for your copy now.

LINERETTE INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

CLIMCO
PROCESSED LINERS

Serving the Rubber Industry for 26 Years

CLIMCO — CLIMCO

Butaprene NXM

IS THE

Preferred Polymer

FOR WATER-PUMP SEAL COMPOUNDS

- **POSITIVE SEAL IN ALL TYPES OF ANTI-FREEZE SOLUTIONS**
- **EASY PROCESSING**
- **GOOD BONDING WITH GRAPHITE**

LOOK at the data at the right. Notice the *low* swell of Butaprene NXM in the various anti-freeze mixtures — *a positive seal* with *every* one. Butaprene N takes them all in stride without excess swell or distortion—just another example of how the Butaprene polymers do the job and do it *right*.

No matter what your compounding problem, you'll find a Butaprene polymer for the job. The Butaprene technical staff will be glad to work with you on any problem involving oil-and-fuel-resistant elastomers in either latex or solid form. Simply write Xylos Rubber Company, Distributors, Akron 1, Ohio.

Listen to the Voice of Firestone every Monday evening over NBC

Copyright, 1948, The Firestone Tire & Rubber Co.

VOLUME CHANGE IN ANTI-FREEZE SOLUTIONS
250 Hours @ 212° F.

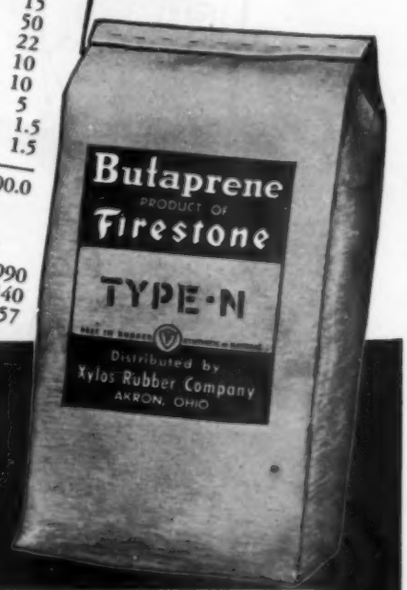
	% Change
Ethylene Glycol and Water 50-50	+4
Ethyl Alcohol and Water 50-50	+2
Methyl Alcohol and Water 50-50	+9
Turkey Red Oil and Water 95-5	+4
Ethylene Glycol 100%	+7
Kerosene 100%	+2
Water 100%	+2

FORMULA
WATER PUMP SEAL STOCK

Butaprene NXM	85
GRS	15
SRF Black	50
FT Black	22
Dibutyl Phthalate	10
Bardol	10
Zinc Oxide	5
Benzo Thiazyl Disulfide	1.5
Tetrone A	1.5
TOTAL	200.0

NORMAL PHYSICAL DATA
Slab Cure 20' x 312° F.

Tensile psi	1990
Elongation %	540
Durometer "A"	57



BUTAPRENE N
by Firestone

AMERICA'S *most* VERSATILE ELASTOMER

The first and Final steps

IN THE PRODUCTION OF ST. JOE Lead-Free ZINC OXIDES

In a series of advertisements during the past two years, every important phase in the manufacture of our Zinc Oxides has been featured.

The advertisement reproduced here in miniature shows the first step—a drillman at work in a stope of one of our zinc mines in upper New York State. Now, after many complicated operations, St. Joe Zinc Oxides are being packed in bags for shipment to the consuming industries where the exceptional purity and uniformity of these pigments have long been famous.

ST. JOSEPH LEAD COMPANY

250 PARK AVENUE • NEW YORK 17 • ELdorado 5-3200

Plant & Laboratory: Josephtown, Beaver County, Pennsylvania

Here's How!

TIME TESTED

GLYCERIZED

(LIQUID CONCENTRATE)

LUBRICANT

Pays Off

In the processing and finishing of synthetic, natural and reclaim rubbers.

SLAB STICKING is eliminated. Simply dip the hot rubber slabs into a GLYCERIZED solution. This assures complete separation of piled stocks without the dust nuisance of talc, soapstone, whiting or clay. Moreover the slabs may be stacked within a short time without danger of adhesion.

MOLDED ARTICLES are released with ease and finished products retain a glossy, satiny sheen when GLYCERIZED is used. Also ideal lubricant for mandrels, cores, belt drums, air bags, etc.

EXTRUDING operations are facilitated and costs are lowered when GLYCERIZED LUBRICANT is applied, with sticking of stock prevented in flat pan vulcanization.

INSULATED WIRE & CABLE processing is greatly aided through the use of GLYCERIZED—in fact, wherever high heat resistant properties are required, this versatile lubricant will be found most satisfactory.

These are but a few of the many purposes for which this exceptional product is adapted and adopted.

GLYCERIZED LUBRICANT is highly concentrated. Only a diluted solution is required for most applications. A LITTLE GOES A LONG WAY!

GET THE GENUINE from GENSEKE

MADE BY THE MAKERS OF
RUBBEROL AND SYNTHOL

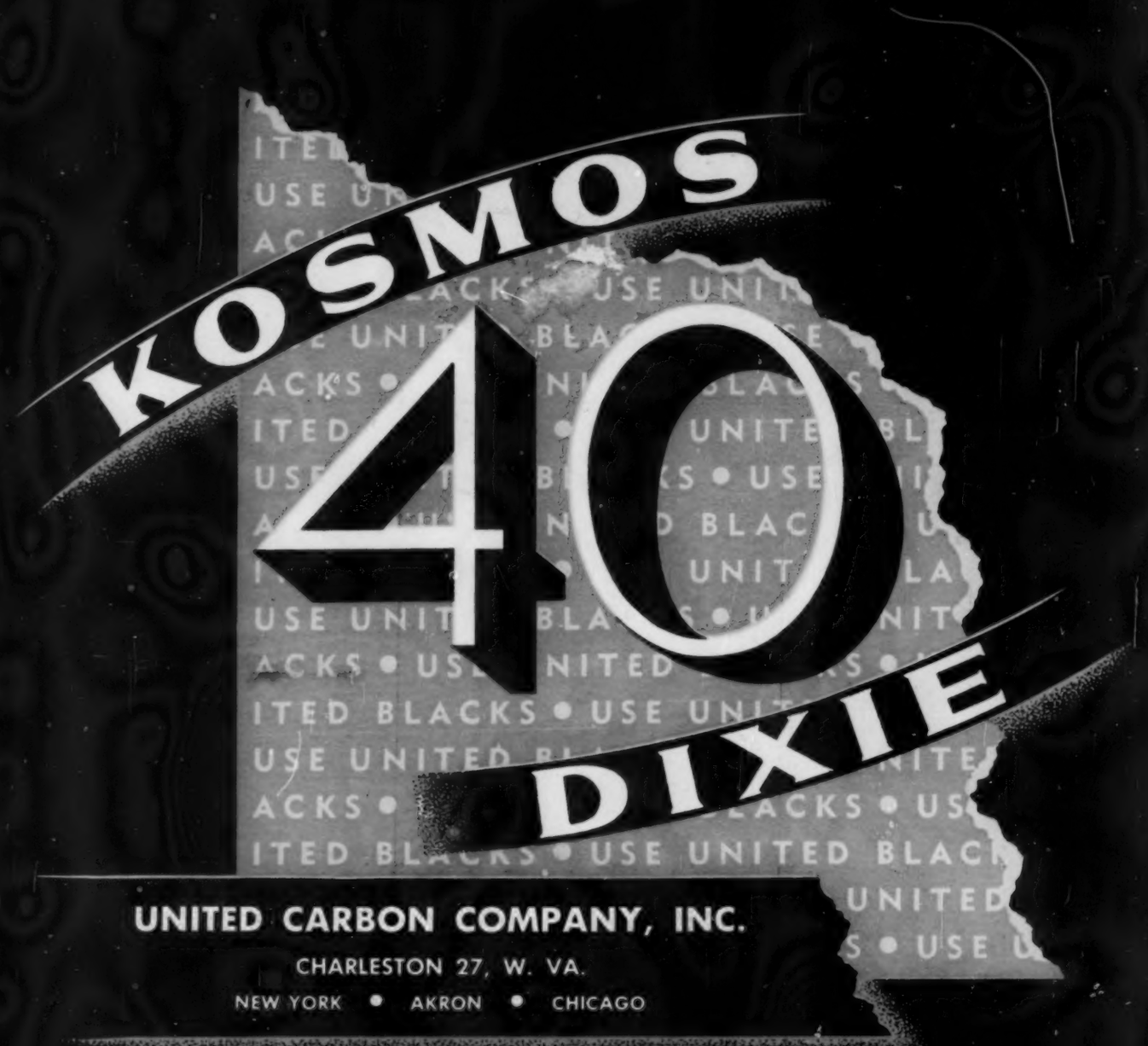
AVAILABLE ONLY IN DRUMS, HALF DRUMS AND QUARTER DRUMS

QUALITY SINCE 1884

GENSEKE BROTHERS

RUBBER MATERIALS DIVISION

West 48th Place and Whipple Street — Chicago 32, U.S.A.


KOSMOS
40
DIXIE
UNITED CARBON COMPANY, INC.
CHARLESTON 27, W. VA.
NEW YORK • AKRON • CHICAGO

DIXIE 40 HMF and KOSMOS 40 HMF have these desirable characteristics—cool mixing, easy processing, smooth and rapid extrusion, fast rate of cure, full reinforcement, low heat build-up, high resiliency and high resistance to cut-growth, flex cracking and abrasion. DIXIE 40 and KOSMOS 40 are furnace type reinforcing carbon blacks, produced by a special process under carefully controlled conditions, especially useful for tires of all types, tubes, footwear and mechanical goods.

RESEARCH DIVISION

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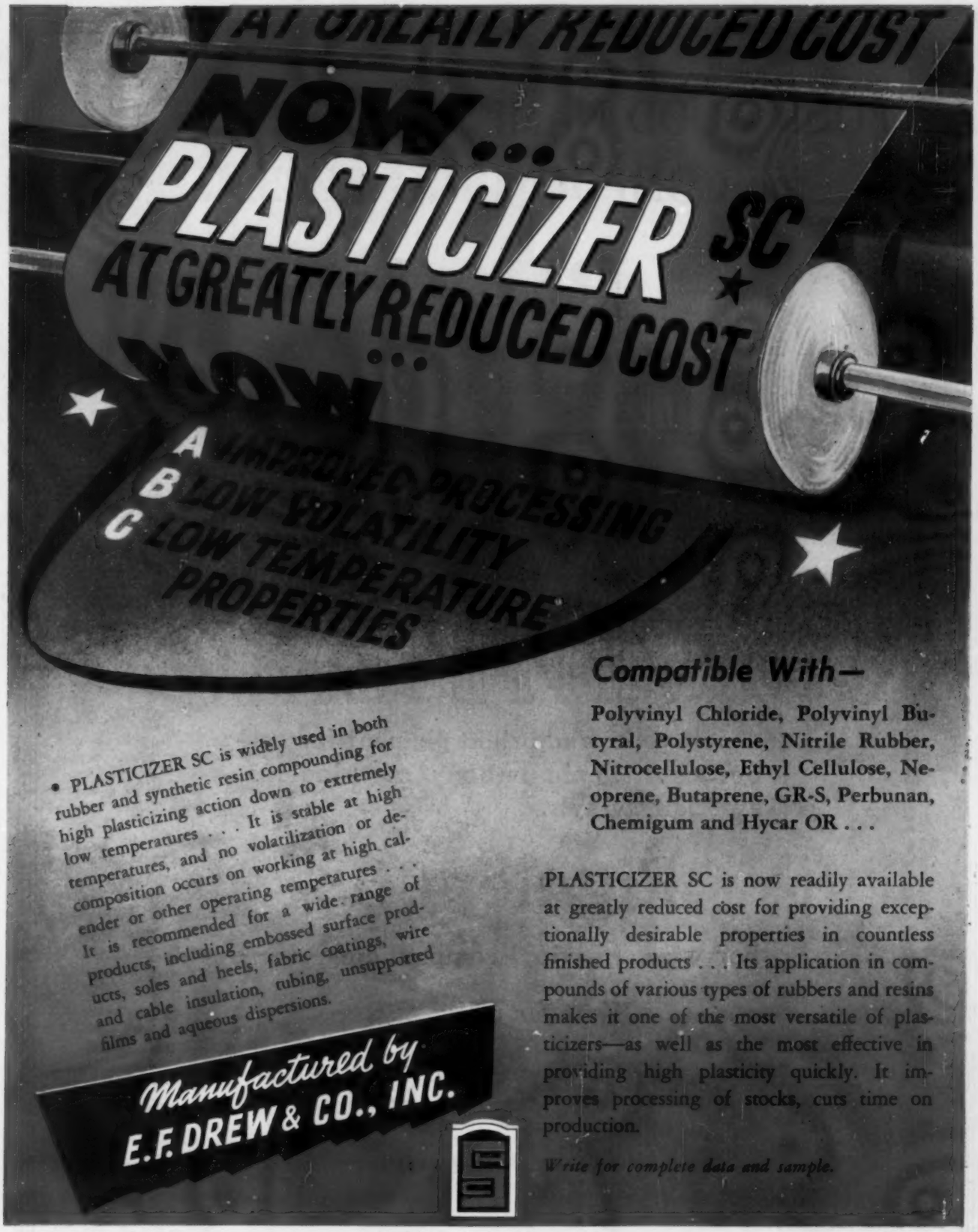

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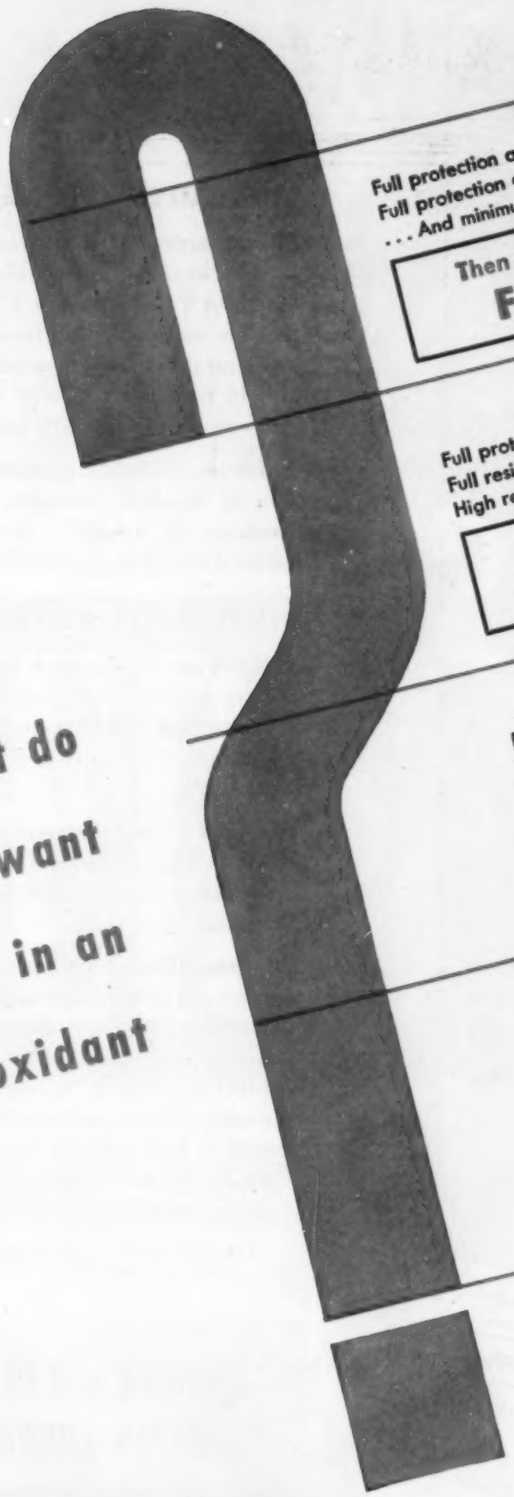

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½ sec. R.S. Nitrocellulose Viscosity, 18% "Vinylite" resin VYHH Solution	Gel Structure	112 cps
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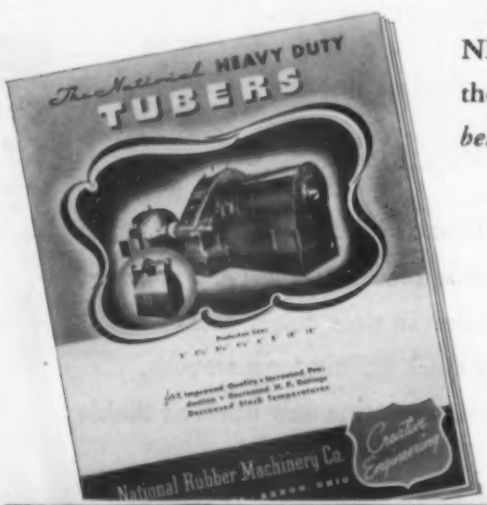

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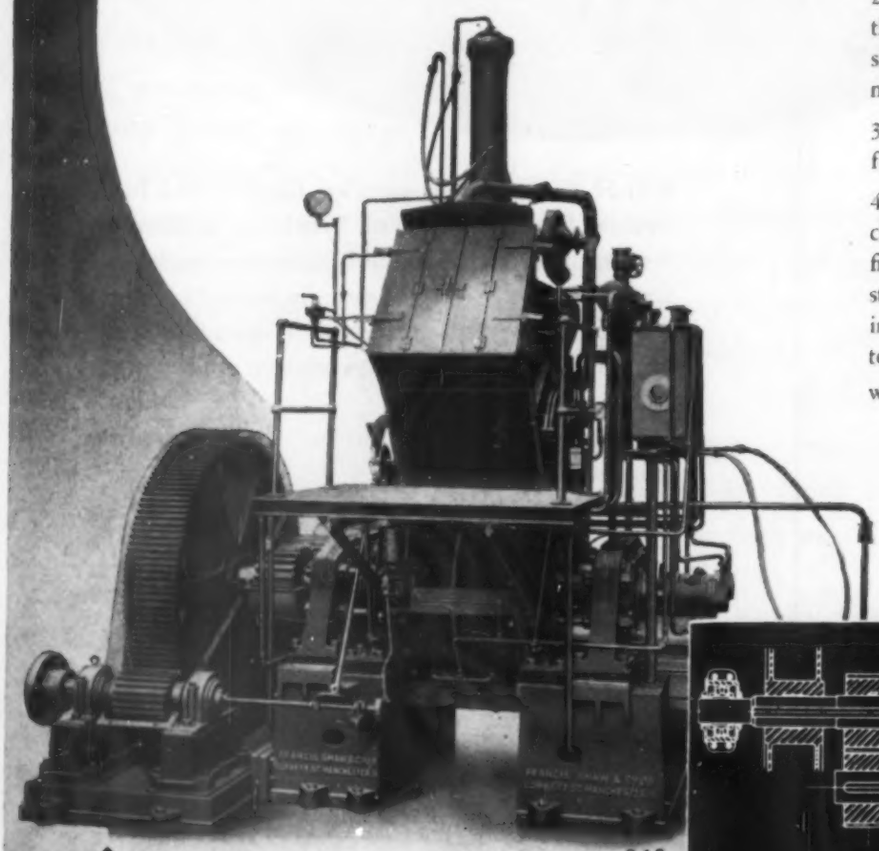

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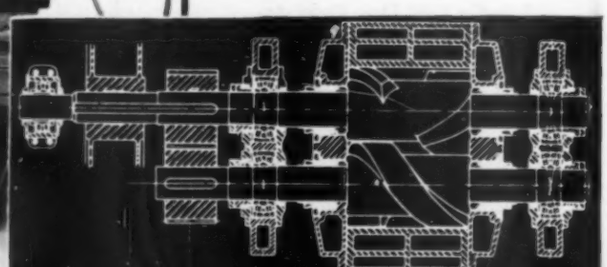

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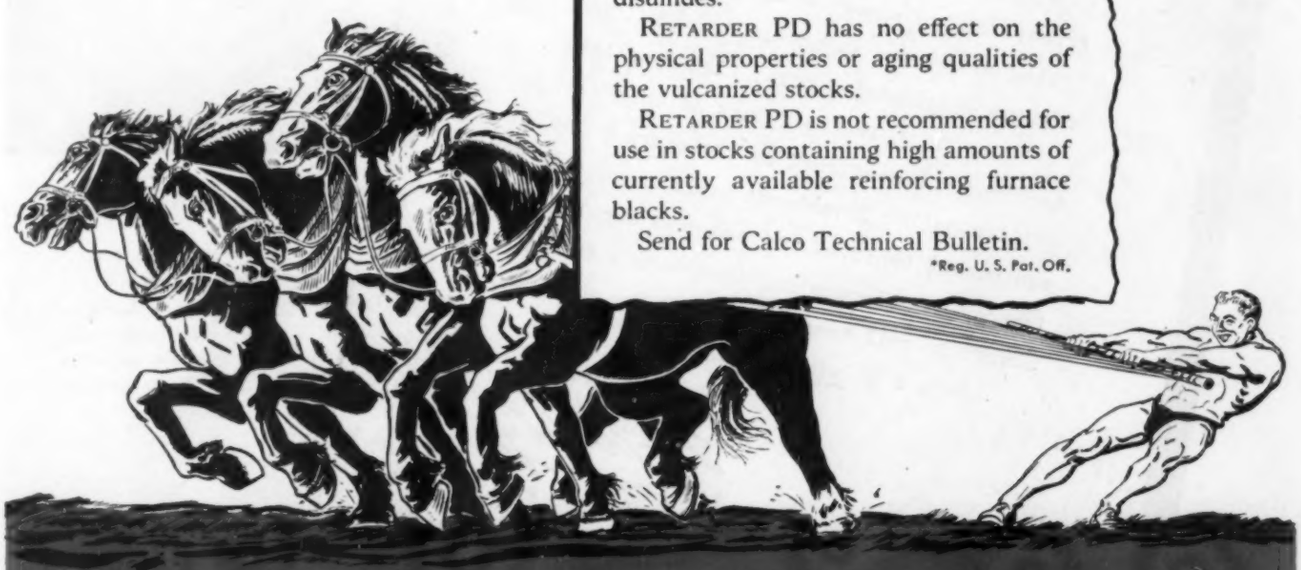

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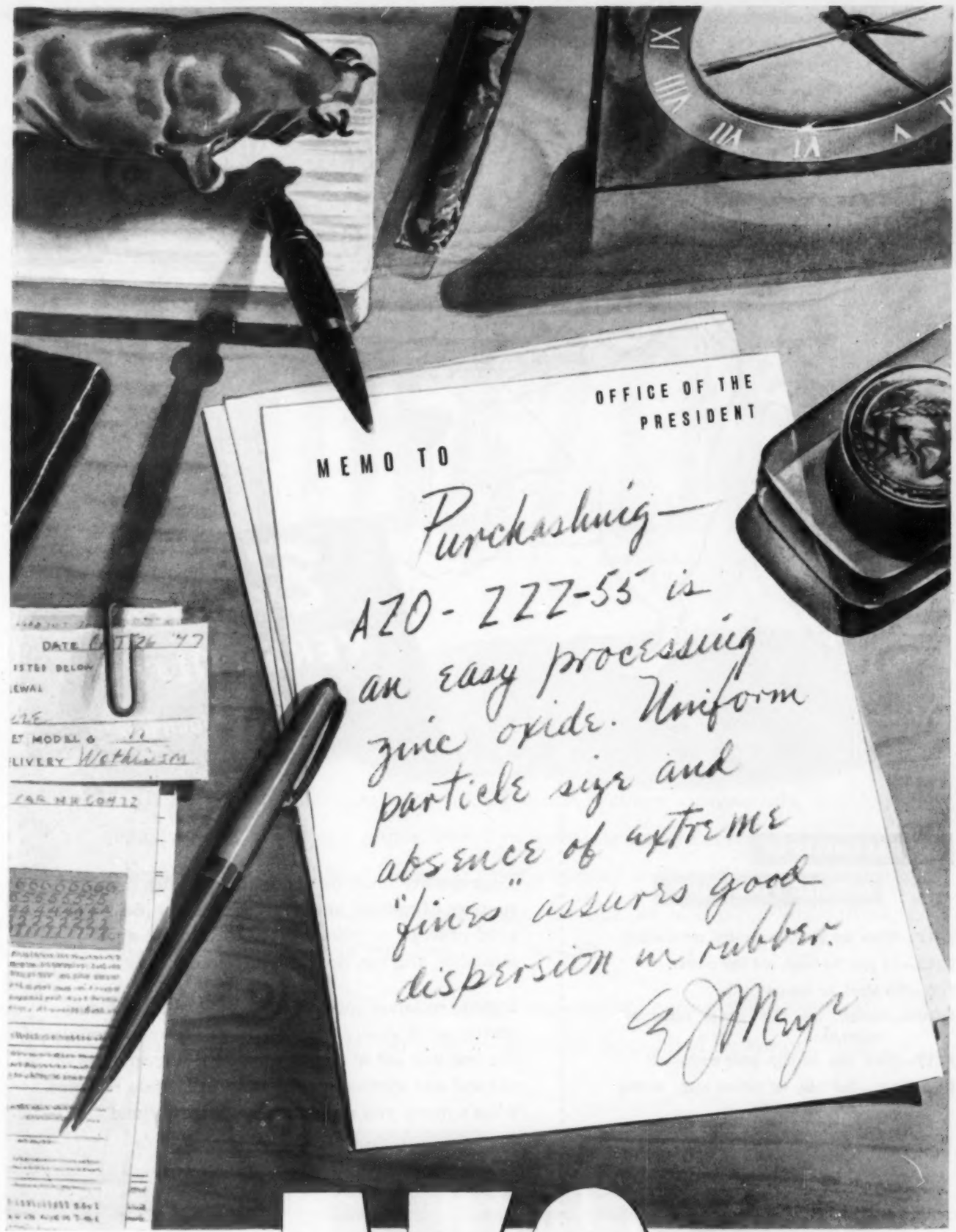

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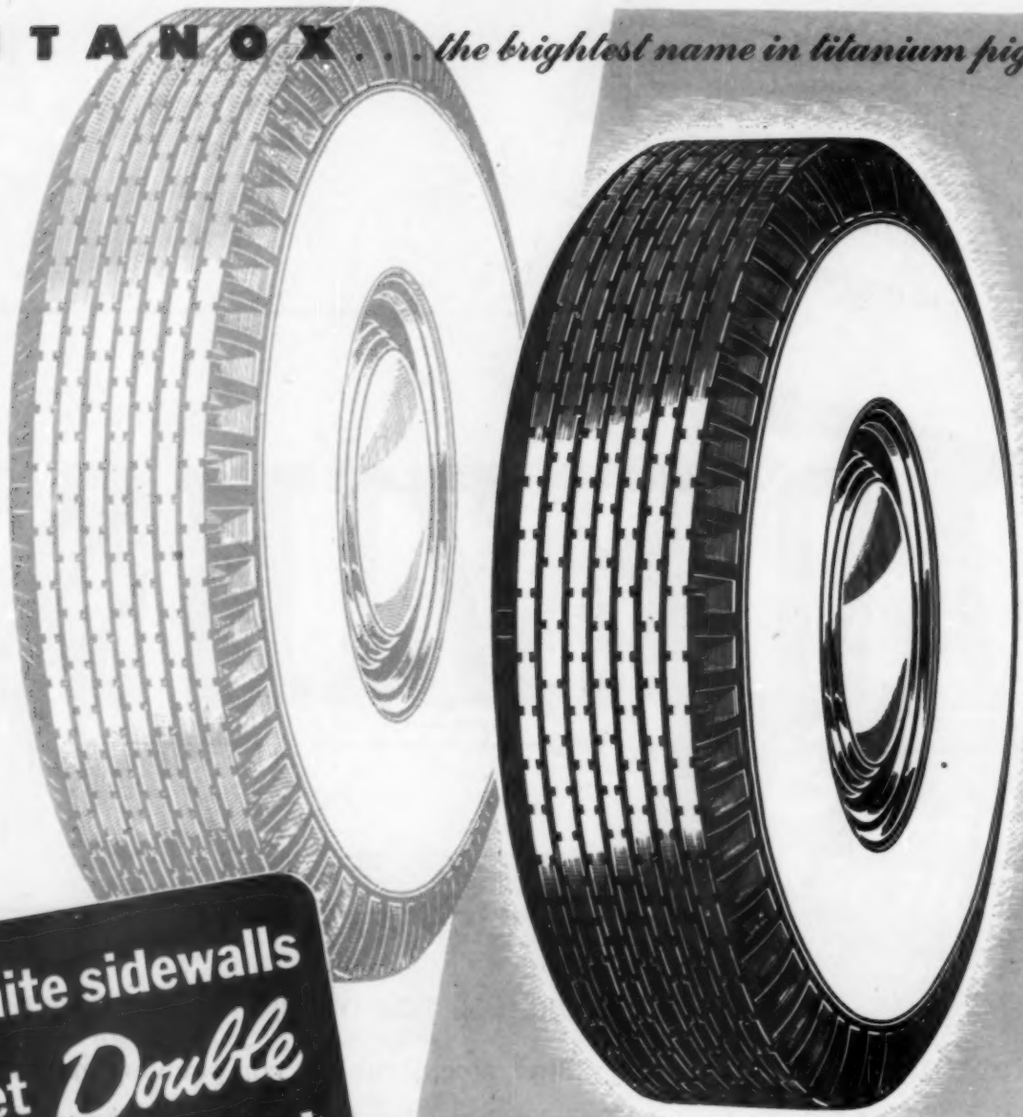

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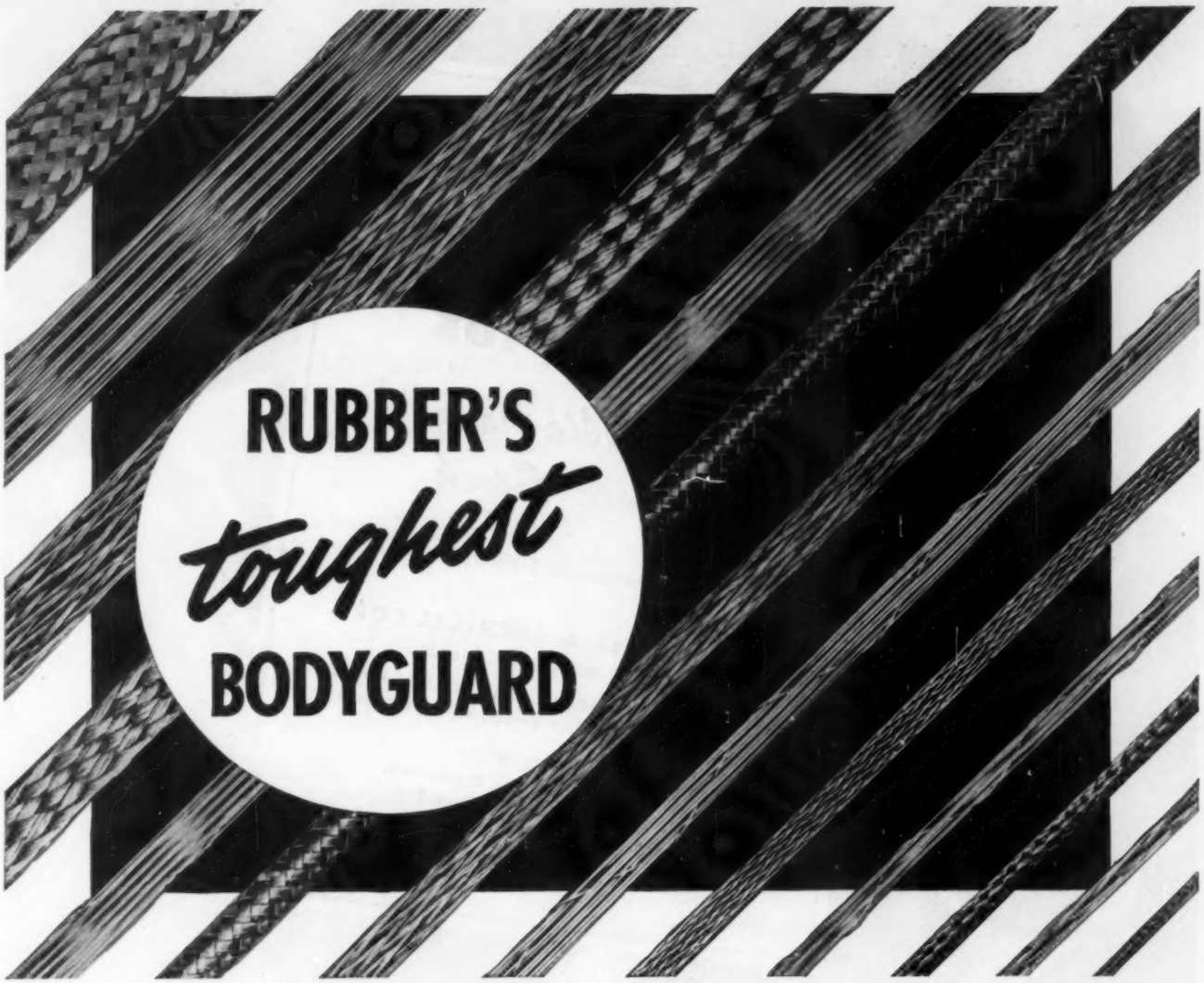

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Cut-Growth or Crack-Growth ASTM Designation D-813-44T

Equipment for carrying out the test at elevated temperatures

Inquiries have been received as to the details of the methods used in carrying out the tests reported in the Technical Bulletins. The data on experimental polymers will be interrupted from time to time to report on the special equipment employed in making the measurements.

IN THE EARLY TECHNICAL BULLETINS the measurements were made at room temperature. In order to speed up the tests the operating temperature was increased to 70 degrees C., beginning with Technical Bulletin No. 22. The equipment for maintaining an ambient temperature of 70 degrees C. was designed and built by the instrument shop, Technical Department, The New Jersey Zinc Co. (of Pa.) (See Figure I).

The reproducibility of cut-growth tests is greatly influenced by the mounting of the samples in the jaws, and to minimize this variable, the jig shown in Figure II is employed. The rubber specimens are first inserted in the frame, which keeps them in identical alignment until they are clamped in the jaws of the flexometer. This jig was also designed and built in the Technical Department instrument shop.

The tests are carried out in accordance with ASTM Designation D-813-44T with the following exceptions:

Needle diameter	0.047 inches
Flexing cycles	280 per minute
Ambient temperature . .	70 degrees C.

The samples are gripped 1⅛ inch from the end instead of the ASTM recommendation of 1⅜ inch. This changes the adjustment of the machine under Section 7 of the ASTM Specification to read as follows: "Approach each other to a distance of 1¼ inch and separate to a distance of 3½ inch. The results are reported in inches for the indicated number of cycles.

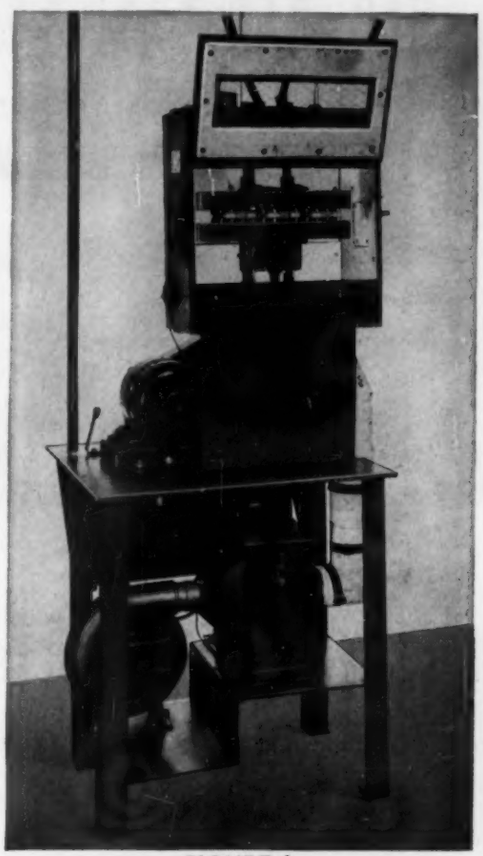
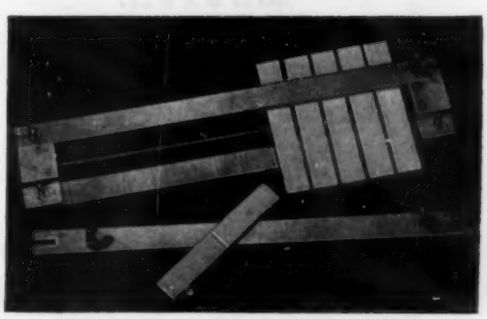


FIGURE I



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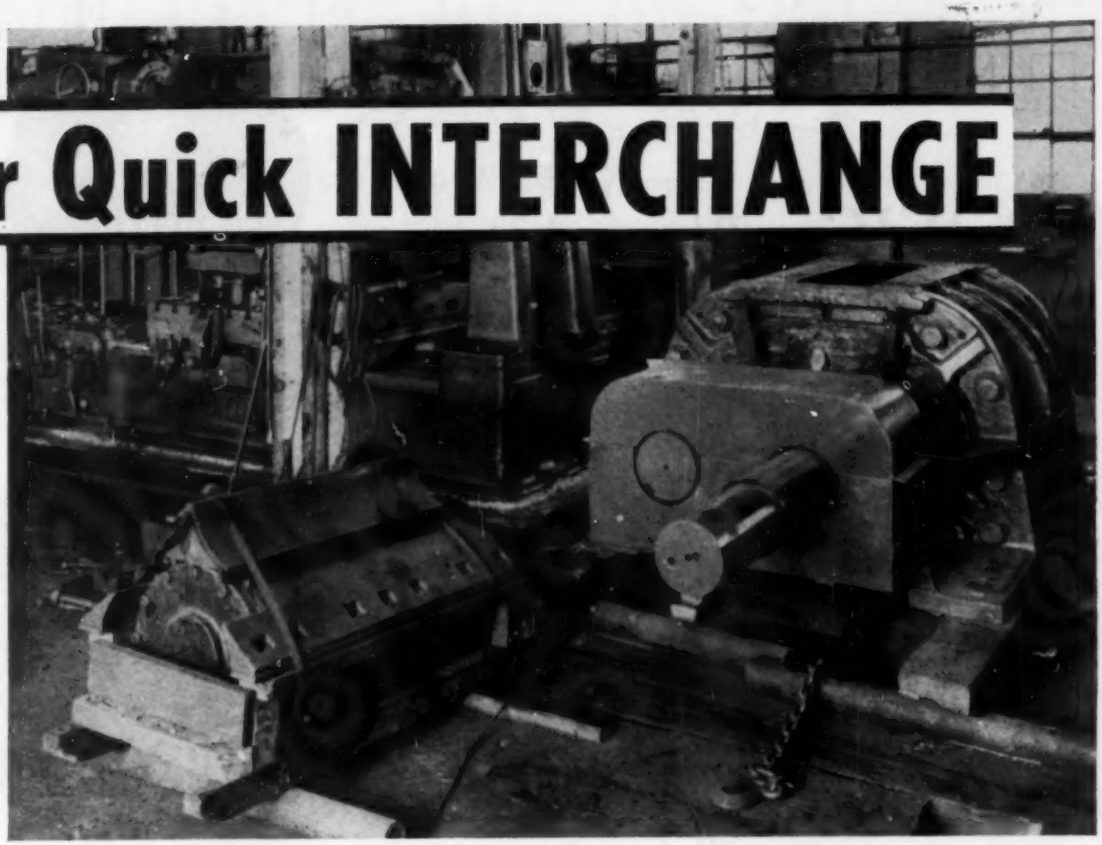

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RUBBER AGE

Vol. 62, No. 6 MARCH, 1948

The Colloidal Stability of Rubber Latex

By E. G. COCKBAIN

British Rubber Producers' Research Association, Welwyn Garden City, Herts., England

THE complexity of natural (Hevea) latex as a physical and chemical system has been emphasized on many occasions, but it should also be appreciated that, in many respects, its colloidal behaviour is very similar to that of a large number of other colloidal systems. Although the present article is concerned mainly with the stability of ammoniated latex, the colloidal principles we propose to consider are of wide application. The same basic physical factors which determine the stability of ammoniated latex will also determine that of fresh or compounded latex, though the relative importance of the different factors will not always be the same.

Since most of the water-insoluble material of latex is present in the form of relatively large particles (from the colloidal point of view) whose density is appreciably different from that of the serum, some creaming of the individual particles occurs fairly readily. Apart from this simple creaming effect, which is not to be confused with induced creaming by water-soluble gums, etc., any other change in the state of dispersion may be regarded as an indication of colloidal instability. Thickening, gel formation, coagulation, flocculation of the particles without actual coalescence and induced creaming are common examples of phenomena associated with changes in the state of dispersion of the particles.

Means of reducing the stability of latex are numerous, including, as they do, addition of acids and alkalis, inorganic salts, water-miscible solvents, compounding ingredients of many types, mechanical agitation and frictional forces. A given sample may be more than normally stable to one of these agencies and less resistant than usual to another. For example, dialyzed ammoniated latex is more stable to inorganic salts than the undialyzed latex but is less stable to mechanical forces.

Since the stability of latex depends ultimately on the properties of the interfacial film surrounding the particles, a knowledge of the composition and structure of this film is of fundamental importance. In recent years, much information has been obtained—particularly from analytical and electrokinetic studies—indicating that the great majority of particles in ammoniated latex possess an inner "core," consisting chiefly of rubber hydrocarbon, on top of which is a layer of fatty material (lipid layer). Adsorbed on the lipids is an outer film of proteins and fatty acid soaps.

The composition of the lipid layer has not yet been established in detail but fats and lipids found in Hevea latex include sterols and sterol glucosides *(1, 2)*, triglycerides *(3)*, phospholipids *(4, 5)* and eicosyl alcohol *(2)*. Not all these substances need be present, necessarily, on the average particle, for the occurrence of "resin particles" implies a non-uniform distribution of the lipid material.

As regards the composition of the outer film of soap and protein, Baker *(6)* has shown analytically that approximately one quarter of the acetone extract of ammoniated latex (six months old) consists of fatty acid soaps present at the particle interface. A proportion of the soaps may be associated with the lipid layer rather than the protein film, but dilution of the latex results in desorption of the soaps, i.e., they are reversibly adsorbed. For a similar latex, Baker *(7)* found that adsorbed proteins accounted for approximately 20% of the total nitrogen. Adsorption of the proteins is also reversible, at least partially, desorption being favored by dilution or by an increase in pH value.

Electrophoretic data indicates that in undiluted ammoniated latex the proportion of protein in the outer adsorbed layer is high and the proportion of soap low. However, the composition of the system as a whole and of the interfacial film varies with the age of the latex. The proteins are slowly broken down by hydrolysis while the percentage of ammonium soaps increases owing to hydrolysis of fats and phospholipids.

The interfacial film in old latex therefore contains less

protein and more soap than in freshly ammoniated samples. Similarly, if soap or other surface active material is added, some of the adsorbed protein is replaced by these agents; indeed, if sufficient is added practically all the protein can be removed. Some of the lipids associated with the particles can also be displaced by soaps *(6)*.

Factors Responsible for Stabilization

Electric Charge on the Particles: The variability in composition of both the lipid and soap-protein layers obviously implies a variable colloidal stability. Nevertheless, the factors responsible for stabilization may be considered constant even though their relative importance varies with different latices and different coagulants.

The general behaviour of ammoniated latex is that of a hydrophilic colloid, due, of course, to the outer soap-protein layer. Following classical theory, its stability has therefore been attributed in the past to two factors —the electric charge on the interfacial film and the degree of hydration.

A single particle in ammoniated latex is shown diagrammatically in Fig. 1. At pH 9 to 10 almost all the acidic groups of the soaps and proteins are ionized, thereby conferring a negative charge to the particle; also bound to the surface are a few cations, e. g. ammonium ions, and a certain amount of water.

All molecules and ions *outside* the dotted line (the surface of shear) in Fig. 1 can move independently of the particle. The ions in the immediate neighborhood of the surface of shear are predominantly cations (the anions being repelled by the negatively charged surface) and constitute an ionic atmosphere or "shield" which diminishes the repulsion between the latex particles. Of course, repulsive and attractive forces between *charged* bodies cannot be the only ones operating, since in that case adhesion of similarly charged particles would never occur, even when the charge was small.

The basic cause of adhesion between such particles is that the adsorbed soaps and proteins contain groups possessing dipole moments, as well as fully ionized groups. The dipole moments may be a permanent feature of the molecules or may be induced by the close approach of other molecules or ions, and it can be calculated that the interaction between dipoles (or between dipoles and ions) leads to an over-all attraction—the so-called van der Waals attraction. It has not yet been possible to carry out this calculation quantitatively for a system so complex as latex.

Addition of neutral salts, e.g. sodium chloride, to latex increases the concentration of sodium ions in the ionic atmosphere and, owing to the "shielding" effect of these ions, the negatively charged particles can approach one another more closely. If the approach is close enough, the attractive forces mentioned above are sufficiently strong to cause adhesion. A certain proportion of sodium ions may actually be adsorbed at the surface, in which case the electrostatic repulsion between the particles is reduced, and adhesion facilitated.

Both the shielding phenomenon and the adsorption effect increase markedly with increasing valency of the added cation. Adsorption, however, is strongly influenced by the size of the ion as well as by its valency, the large barium ion, for example, being adsorbed more readily than the small magnesium ion. This is a major cause of the greater coagulating power of barium salts compared with those of magnesium.

Degree of Hydration: A second factor partly responsible for the stability of latex and hydrophilic colloids in general is the degree of hydration of the particles. The coagulation of latex by solvents with a high affinity for water (acetone, alcohol, etc.) is attributed to dehydration of the interfacial soap-protein film. Hydration of the particles can also be diminished by the addition of solid powders with a high water affinity, or by suppressing the ionization of the carboxyl groups in the adsorbed film (ionized groups are particularly strongly hydrated).

As regards the mechanism of stabilization by hydration, it has been postulated that a layer of water, several molecules thick, can be "bound" at the interface, thereby promoting stability by a mechanical "buffer" action during collision of the particles. Before this explanation is accepted, more information is needed concerning the physical properties of "bound" water at interfaces.

Interfacial Tension

So far it has been assumed that the soap-protein film is so strongly adsorbed that it is not displaceable, even locally, from the particle interface. Actually, both the soap and protein can be displaced, as was made evident in discussing the composition of latex. This accounts for other factors affecting stability, especially in connection with coagulation phenomena. A difference should be noted here between latex and hydrophilic colloids in solution, e.g. protein solutions, for in these systems no question of film displacement arises.

One of the quantities to be considered when the film is displaceable is the magnitude of the interfacial tension γ_{PS} (i.e. the free energy increase in ergs/cm² involved in the formation of 1 cm² of particle/serum interface). The influence of γ_{PS} on the stability of systems stabilized by soaps or synthetic surface active agents is usually considered to be very important, particularly for emulsions of oil in water.

The value of γ_{PS} in ammoniated latices is not known but it may be said that the smaller its value, the less will be the *tendency* for displacement of the soap-protein film to occur, with local coalescence of the particles.

Interfacial tension is a factor which may well be more important in compounded latices containing synthetic surface active agents than in ammoniated latex itself.

Interfacial Viscosity, Elasticity and Plasticity

In general, proteins are not as effective as many other surface active agents in lowering the surface tension of water or the interfacial tension of hydrocarbon oils against water; this is the reason for their displacement by soaps at many interfaces. The efficiency of proteins at alkaline pH values in preventing coagulation of latex is partly due, almost certainly, to the mechanical properties of the adsorbed protein, e.g. the interfacial viscosity, elasticity or plasticity.

A high viscosity should tend to prevent the sufficiently rapid local displacement of the film which would enable particles to coalesce on impact. If the film possesses mechanical strength, i.e., behaves as an elastic or plastic solid, its displacement or disruption by mechanical forces will clearly be rendered more difficult. In this respect proteins should be good stabilizers, for they frequently form highly viscous or elastic solid adsorbed films.

In technical processes where the latex is subject to frictional forces or vigorous agitation, the mechanical properties of the interfacial film should be a main factor determining stability.

It is unlikely that the coagulation of latex, as distinct

from flocculation, *invariably* requires a displacement of the film. Heavy metal salts, for instance, are powerful coagulants for protein in solution and it is probable that by addition of such salts to latex, many of the particles in the resulting clot are held together by a film of coagulated protein.

Influence of the Lipid Layer

Although the immediate cause of decreased stability can be ascribed to the factors discussed above, the influence of the lipid surface on which the proteins and soaps are adsorbed is by no means negligible. Thus, Paton *(8)* has reported recently that relatively unstable latices can be stabilized by small amounts of phospholipids isolated from Hevea latex. More generally, the interfacial tensions of protein solutions at different oil/water interfaces are known to depend markedly on the nature of the oil, the same being true, of course, with soap solutions.

Adsorption of soaps at various oil/water interfaces has been studied in some detail; it is found that if certain water-insoluble polar compounds such as sterols or long chain aliphatic alcohols are present in the oil, even in very small amounts, extremely low interfacial tensions can often be obtained, due to strong forces of inter-molecular attraction between the soap molecules and sterols, or alcohols, at the interface. Furthermore, marked changes in the mechanical properties of the interfacial film often occur. Sterols and long chain alcohols, it may be noted, are two of the lipid components of latex.

The influence of the lipid layer requires more detailed investigation than has been attempted so far, but there is no doubt that it plays a significant—if indirect—role in determining stability.

Correlation between Interfacial Properties and Bulk Changes

One of the main objectives in studying the properties of the interfacial film in latex is to correlate the findings with such practical manifestations of instability as creaming, thickening, gelation, flocculation and coagulation. This correlation, at present, is far from complete and different theories of creaming, gelation, etc., are still held, most of which, perhaps, are essentially correct for particular systems. All we shall attempt, here, is to emphasize certain features of these colloidal phenomena and illustrate, qualitatively, the relationship between interfacial properties and bulk changes in one or two systems.

One important feature is the close connection between the different effects obtained when the stability of latex is diminished. Whether thickening, gelation or flocculation occurs in a given sample depends largely on the rate at which the particles adhere, which in turn depends on the particular degree of instability produced.

We may consider, as an example, the effect of calcium ions on ammoniated latex. In very small quantities they sensitize the latex to heat. The reduced electric charge at the particle surface, caused by adsorption of calcium ions, is not sufficient to affect noticeably the stability at room temperature, but if the violence and frequency of collisions between the particles is increased by raising the temperature, flocculation occurs.

Somewhat larger amounts of calcium reduce the charge on the particles sufficiently for an appreciable proportion of them to adhere at room temperature, over a period of a few seconds or minutes, and the latex thickens. It might have been expected that the reduced

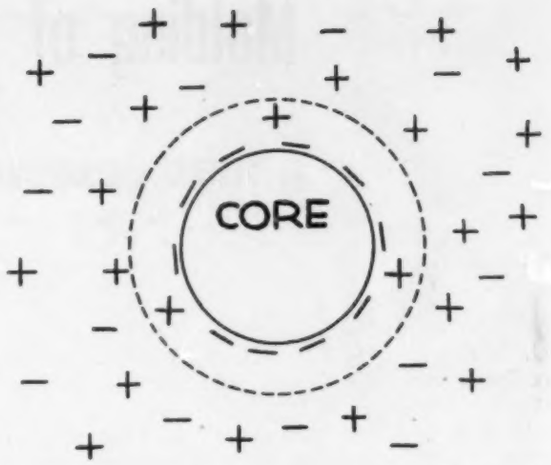

FIG. 1—Diagrammatic representation of particle in ammoniated latex.

charge would lead to a *decrease* in viscosity (compare the low viscosity of protein solutions at their iso-electric point). The probable explanation for the higher viscosity is that some water is trapped by the adhering particles, i.e. the total *effective* volume of the insoluble phase is increased and the amount of "free" serum diminished.

The particles must retain a sufficient affinity for water, since if the degree of hydration as well as electric charge is reduced, flocculation, rather than thickening, is liable to occur. As more particles aggregate, so the amount of water trapped will increase until a continuous network of particles is formed, holding the entire volume of serum, i.e. the latex gels.

The adhesion between most of the particles in the thickened latex is weak, and increased viscosity should therefore be most noticeable when the applied shearing forces are small. This is the case, as shown by the thixotropic behaviour of such latices. Weak adhesion is also indicated by the fact that it is often possible to disaggregate the particles, and thin the latex, by means of suitable surface active agents. By the addition of larger amounts of calcium salts than are required for thickening, the electric charge on the particles is reduced so greatly that almost every collision between them results in flocculation or coagulation.

Little has been said concerning the influence of factors such as temperature and viscosity of the serum on the stability of latex. This is because colloidal stability is primarily a problem in surface chemistry and it is by more detailed information in this field that a fuller understanding of the behaviour of latex will be most readily obtained.

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Note: One of a series based on lectures delivered during 1947-48 by members of the staff of the British Rubber Producers' Research Association at Newton Heath Technical School, Manchester, England.

Molding of O-Ring Packings

By FREDERICK E. CLARK*, WILLIAM P. BALL, and LAVERNE E. CHEYNEY

Battelle Memorial Institute, Columbus 1, Ohio

THE O-ring hydraulic packing (Christensen, N. A., U. S. Patent 2,180,795, March 23, 1939) has largely replaced earlier packings such as the V-ring and U-cup for use in aircraft. The O-ring is an extremely simple design—a doughnut-shaped packing whose composition varies depending upon the desired use. It is popular because of its simplicity, efficiency, and ease of installation. Its use is being rapidly extended to applications other than in aircraft.

Aircraft O-ring packings are made of oil-resistant synthetic rubber with the necessary low-temperature properties built into the compound. A photograph of a typical O-ring is shown in Figure 1. When installed, the O-ring is placed in a machined rectangular groove which may be located in either the stationary or moving part.

Close Tolerances Essential

The O-ring is a precision part. With a one-inch diameter packing, for example, there is a tolerance of ± 0.006 inch on the inner diameter. Tolerances as close as these are not usually associated with rubber products. O-ring molds must be precision made and are usually chromium-plated, individually-centered, watch-case type. With the finest product of the moldmaker's art and with a superior formula, good O-rings still can not be made without careful molding technique. It is the purpose of this report to point out a few of the observations made in this laboratory concerning proper molding.

It is difficult to vulcanize flawless O-rings, and freedom from small bubbles and cuts is necessary for satisfactory performance. Possible methods of preparation of O-ring stock include:

* Present address: Natural Rubber Extraction Unit, B.A.I.C., U. S. Department of Agriculture, Salinas, Calif.

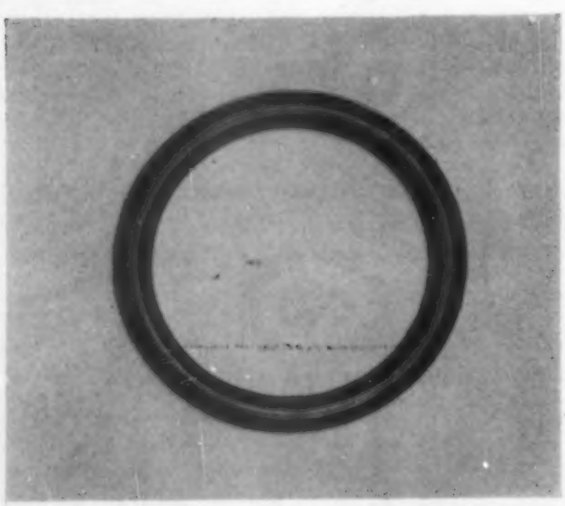

FIG. 1—Typical O-ring packing.

TABLE I—COMPARISON OF SHEET STOCK VERSUS EXTRUSION METHODS OF PRODUCING O-RINGS

Recipe	
Perbunan 18	100.
Medium-processing channel black	75.
Zinc oxide	5.
Stearic acid	1.
Sulfur	1.5
Benzothiazyl disulfide	1.5

Optimum cure: 30 minutes at 310° F.

	Tensile Strength, Lbs./Sq. In.	Elongation, %	Stress at 100% Elongation, Lbs./Sq. In.
Unaged AN6227—28 O-Rings, Cut From 1-Ply Stock, Using Template			
	2940	232	700
	2160	188	795
	3100	214	675
	2820	223	750
	1910	193	725
	4050	284	675
	2560	227	725
	3140	171	725
Average	2760	211	721
Unaged AN6227—28 O-Rings, Strips Cut From 1-Ply Stock, Butt Joined			
	535	67	...
	1110	128	650
Average	882	97	650
Unaged AN6227—28 O-Rings, Strips Cut From 2-Ply Stock, Butt Joined			
	3340	245	668
	3760	257	735
Average	3550	251	702
Unaged AN6227—28 O-Rings, Strips Cut From 3-Ply Stock, Butt Joined			
	3890	300	649
	2180	221	695
	3300	286	665
	3090	270	665
Average	3115	269	668
Unaged AN6227—28 O-Rings, Extruded Rod, Bias Joined			
	4450	304	810
	4200	282	825
	3930	304	785
	3950	282	825
	4090	285	825
	4150	290	830
Average	4128	291	816
A.S.T.M. Dumbbell Specimens			
Average	3470	340	770

TABLE II—COMPARISON OF EXTRUDED BUTT-JOINT VERSUS EXTRUDED BIAS-JOINT METHODS OF PRODUCING O-RINGS

Recipe

Perbunan 18	100.
Medium-processing channel black	75.
Zinc oxide	5.
Stearic acid	1.
Sulfur	1.5
Benzothiazyl disulfide	1.5
Tributoxyethyl phosphate	20.

Optimum cure: 30 minutes at 310° F.

Tensile Strength, Lbs./Sq. In.	Elongation, %	Stress at 100% Elongation, Lbs./Sq. In.
Unaged AN6227—28 O-Rings, Extruded Rod, Butt Joints		
1860	268	690
2000	280	605
750	181	570
1700	255	570
Average 1577	246	608
Unaged AN6227—28 O-Rings, Extruded Rod, Bias Joints		
3800	400	520
3650	379	530
3850	397	550
3630	400	590
Average 3732	394	548
A.S.T.M. Dumbbell Specimens		
Average 2970	540	230

1. Cutting a ring from sheet stock with a die or with a knife and template.
2. Cutting a strip from sheet stock (single or multiple ply) and butt or bias jointing to form a ring.
3. Extruding a tube and slicing off a ring. Size limitations on the extrusion die limit the application of this method to small-size O-rings.
4. Extruding a rod and butt or bias jointing.

All methods, except No. 3, have been tried in this laboratory with Perbunan 18 stocks. Butt joints tended to pull apart at the joint. All the methods of preparation from sheet stock were characterized by a tendency to trap air; the prepared stocks do not conform closely enough to the mold dimensions.

Extruding a rod and bias jointing gave the best results as judged by consistency of stress-strain properties.

FIG. 2—Extruded stock ready for bias jointing.

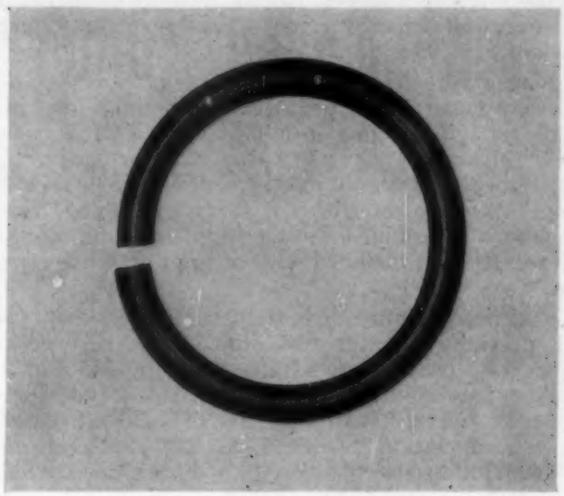

FIG. 3—Typical broken O-ring prepared by bias jointing (after oil aging).

Illustrative data are shown in Tables I and II. These data were obtained by using a Scott rubber tester modified with power-driven spools to relieve local stresses in the rings. A picture of extruded stock cut for bias jointing before vulcanization is shown in Figure 2.

The bias joints should be freshened with a solvent such as acetone before jointing, to remove bloom and to provide a tacky surface. This is most important after

TABLE III—EFFECT OF AIR AND OIL AGING ON EXTRUDED BIAS-JOINT O-RINGS

Recipe

Perbunan 18	100.
Medium-processing channel black	75.
Zinc oxide	5.
Stearic acid	1.
Sulfur	1.5
Benzothiazyl disulfide	1.5
Dibutoxyethoxyethoxy methane	20.

Optimum cure: 45 minutes at 310° F.

Tensile Strength, Lbs./Sq. In.	Elongation, %	Stress at 100% Elongation, Lbs./Sq. In.
Unaged AN6227—28 O-Rings, Extruded Rod, Bias Joints		
4320	370	510
4460	388	480
4070	368	475
4100	359	480
Average 4235	371	488
Air-Aged (7 Days at 158° F.) AN6227—28 O-Rings, Extruded Rod, Bias Joints		
3960	268	905
3500	260	905
4050	277	940
Average 3826	268	916
Oil-Aged (7 Days at 158° F.) AN6227—28 O-Rings, Extruded Rod, Bias Joints (Spec. AN-VV-O-366B fluid)		
3250	268	751
2630	248	768
2450	226	810
3160	264	780
Average 2872	250	777

the stock has been stored. Not all solvents were found to be equivalent in effectiveness; benzene, for example, was much inferior to acetone.

O-rings properly produced by the bias-joint and acetone technique do not pull apart at the bias joint after oil or air aging. Aging in hydraulic fluid for 7 days at 158°F. is an important test inasmuch as the packing is in contact with this fluid during service. Table III lists typical results obtained after air and oil aging. Figure 3 shows a bias-joined O-ring tested after oil aging. A clean break was obtained with no sign of splice separation.

A curious feature of ring testing is that properly prepared O-rings test from 20 to 55 per cent higher in tensile strength than do A.S.T.M. dumbbell specimens prepared from the same stock (last line of Tables I and II), although size AN6227-28 (Army-Navy Aeronautical Standard AN6227) O-rings such as those tested are thicker (0.210 inch as compared to 0.075 inch). These higher results are presumably caused by skin effects which are not obtained with the die-cut dumbbell specimens. It is possible that results of similar magnitude might be obtained with molded dumbbell specimens, but this question has not been included in this study.

It should be emphasized that the results described may apply only to specific types of stocks. It does not follow that extruded bias-joined stocks would be best with all of the different formulations which might be used in making O-rings. It would be expected that poor bonding stocks might fail at the splice even when careful precautions are taken. It should be further emphasized that good workmanship is required with any method of molding O-rings.

ACKNOWLEDGMENT

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Adjustable Troughing Idler Increases Life of Conveyor Belts

A NEW adjustable troughing idler that is reported to materially increase the life of conveyor belts has been introduced by the Koppers Co., Inc., of Pittsburgh, Penna. The idler is the invention of P. J. Conners of the company's engineering and construction division.

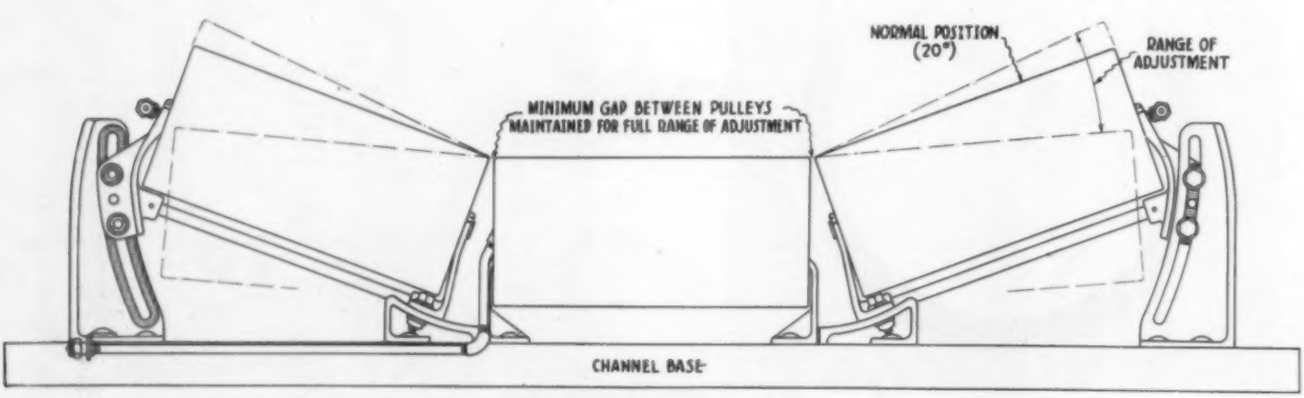
Outer inclined pulleys are adjustable from slightly above the horizontal up to an angle of 25 degrees. All idler pulleys are located in the same vertical plane and the adjustment of the outer pulleys is accomplished in a manner which maintains a constant gap between the ends of the horizontal and inclined pulleys. This gap is kept to a minimum to eliminate any possibility of the belt being damaged due to creasing or pinching at such points.

With this adjustable type of idler the accent is on increased conveyor belt life, as conveyor belts in general are usually quite expensive. With this new design it is possible to practically tailor-make the idler installation to fit the conveyor belt. Some materials do not require as deep a trough as that given by the standard 20° troughed idlers, and this Koppers improved idler design can be used in such cases to provide any suitable depth of trough.

This adjustable idler design is ideally suited for use at locations on conveyors where any inclined belt changes to a horizontal path. At present this change in belt direction is accomplished by use of a flat bend pulley, or by a number of 20° troughed idlers arranged to form a vertical curve. Spillage often occurs when a conveyor belt flattens out while passing over a bend pulley, and the belt is affected by the sudden change from a troughed section to flat and vice versa.

When standard 20° troughed idlers are used on a vertical curve, the conveyor belt is unduly stretched at the edges when passing over these idlers, due to the deep trough. With this new idler design a suitable number of adjustable idlers can be used to form a vertical curve and provide the shallowest depth of trough necessary to retain the material without spill. This shallow trough will also eliminate excessive belt stretch at the edges.

The use of a suitable number of these adjustable idlers, at the feed and discharge ends of belt conveyors, will allow the belt to be troughed or flattened gradually. This will reduce the strain on the belt due to the elimination of the abrupt distortion of belt when entering or leaving the idlers. This is especially pronounced at discharge ends of conveyors where belt stresses are usually the highest.


NORMAL POSITION (20°)
RANGE OF ADJUSTMENT
MINIMUM GAP BETWEEN PULLEYS MAINTAINED FOR FULL RANGE OF ADJUSTMENT
CHANNEL BASE

Schematic sketch of the new Kopper's adjustable troughing idler.

Present Techniques and Future Possibilities in the Preparation of Natural Rubber Latices

By E. M. McCOLM

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The following paper is based on a talk given by the author before the Ontario Rubber Section of the Chemical Institute of Canada at Toronto, Canada, on January 20, 1948. Although somewhat fundamental in nature insofar as the production and treatment of latex is concerned, it is an excellent review of present techniques. Furthermore, as the author points out, memories of natural rubber latex have become a little dim, and the article will serve as a refresher to many of its readers. Some pertinent suggestions are advanced for improvement of the rubber hydrocarbon at its source, a subject which has intrigued botanists since the discovery of rubber itself.—Editor.

NATURAL rubber latices are now returning to world markets in increasing volume, and it might be interesting to describe their methods of preparation and properties, and what to expect in the future. Before discussing these methods, however, and for the benefit of those whose memories of the natural product have become a little dim, let us take a look at natural latex as it comes from the tree. When I say tree in this sense I mean the average tree, for very little is known of tree-to-tree variations, although it is known that they exist.

In the first place, the latex is an emulsion of natural rubber hydrocarbon globules in an aqueous serum, and there is good evidence in favor of the separate existence of natural lipin globules as well. The average particle diameter is about 0.2 micron, and the size distribution curve has a tail extending down into the submicroscopic range. As a comparison, the average particle size of Type II synthetic latex is 0.07 microns, of Types III and IV, 0.11 microns, and of Naugatuck Chemical's new X-409 latex, 0.15 microns.

Most of the experimental work done in the past on the analysis of natural late and on the effects of variation in its constitution on its properties has been concerned with the non-rubber constituents, and their effect on latex and film properties. No one that I know of has attempted to measure any variations in the fundamental properties of the hydrocarbon itself, and it is therefore not known whether all trees always produce exactly the same molecular size and configuration of rubber or not.

It is one of the curious anomalies of scientific effort that the latex chemist in the past has completely neglected to study the fundamental properties of the substance present in highest concentration in latex, and has concerned himself almost exclusively with those substances present in minor amounts—he has been too close to the forest to see the trees.

This natural latex, then, as it comes from the tree, contains the more-or-less unknown substance, natural rubber, and is stabilized by a protein which resembles casein. Its lipin globules probably also contain carotene, and its aqueous phase contains certain salts, an antioxidant, 1-methyl inosite, and a water-soluble captax activator which is not proteinaceous, and other minor substances including certain enzymes. It also contains about 5 million bacteria per c.c. after it has dripped into the tapping cup, which will increase in a few hours to hundreds of million, and cause coagulation by acid formation.

This is the starting material we have to work with—a product of the Hevea reactor produced from an unknown monomer, by an unknown reaction mechanism, using an unknown catalyst, short-stopped probably by entropy, modified by an unknown modifier if any, probably subject to the control of some kind of unknown directing mechanism, and yet capable generally of doing a better job in most cases than the synthetic product about whose reaction mechanism and molecular configuration so much is known.

Preservation of the Latex

To produce a useful product from this starting material, the first constitutent which we have to do something about is its bacterial content. Having got into the latex from the tapping cut, the air, the spout, the tapping cup, and the collecting bucket, these putrefactive and acid-forming organisms have developed little natural immunity to bactericides and are easily killed off. This is done by getting a preservative into the latex at the earliest possible moment. Many preservatives have been studied, but the only ones which have been used in appreciable quantities commercially are the volatile gases, ammonia and formaldehyde, of which the former is by far the most commonly used.

Now these bacteria which are being killed off are variable in their immunity just as are all living organisms, and the art of latex preservation lies in knowing how much preservative must be used to get close to 100% kill. If insufficient is used, the off-spring of the immune organisms may have higher immunity, in fact may eventually even require certain concentrations of the preservative to permit reproduction. Since they have the ability to cause acid formation, and the development of foul odors, it is easy to see how serious a situation can develop if one's latex system becomes infected with such organisms and if the preservative concentration used is insufficient to inhibit their slow growth.

Ammonia is more than just a good preservative, in fact its other effects are as important as its preservative action. Fresh, unpreserved latex is mechanically very unstable; it can be coagulated quite easily by agitation. Preservation with ammonia raises the pH, therefore increases the charge on the globules, and at pH's around 10 the mechanical stability is more than doubled. As this latex ages, the stability increases nearly ten-fold during the first 1 to 2 months.

It has been shown that ammonium soaps are slowly formed in latex as it ages, and therefore the increase in mechanical stability is probably due to this cause.

It is probably true that the bulk latex industry could never have developed had this stability increase not been effected. This means that ammonia can be supplanted only by a preservative-stabilizer combination which will give bacterial control and adequate mechanical stability.

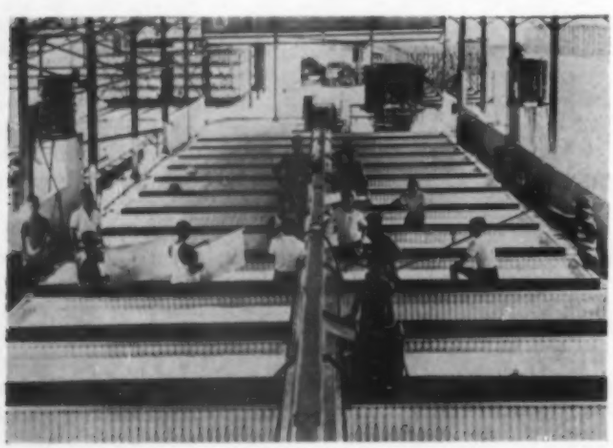
Ammonia performs another and less widely known function, but one equally essential. Latex contains peroxidase capable of causing darkening of its surface on exposure to air. Ammonia deactivates it, as does formaldehyde. If latex is preserved with a bactericide having no enzyme deactivating properties, it will coagulate aseptically in one to ten days. In fact, the latex of some clones coagulates on the tapping cut, long before bacterial activity could become appreciable. Even low ammonia contents will prevent coagulation in such a bactericide-treated latex, and the latex doesn't coagulate even after removal of the ammonia. It is probable, therefore, that there is a "coagulase" present which must be deactivated—another function of ammonia and also of formaldehyde.

Formaldehyde is interesting and has certain special properties which we have utilized in our centrifuged latex types. It not only is a powerful bactericide and enzyme killer, but it irreversibly reacts with proteins at the amino groups and tends to make them less readily metabolized by bacteria. Such latex will not have sufficient stability for satisfactory handling, but can subsequently be treated with ammonia to attain this stability, and in this case less ammonia may be used and still attain safe preservation against subsequent bacterial invasion than is necessary when no formaldehyde is used.

The next step in latex treatment is its concentration. Prewar, and for a short time since the war, some latex was shipped in an unconcentrated form to the U. S. A. The demand for an unconcentrated latex is so low, however, that this type has practically disappeared from the market.

Methods of Concentration

There are two main types of concentrated latex now being produced, namely, centrifuged and creamed concentrates. The method of producing a centrifuged latex is simpler and requires less technical know-how than is the case for cream, but the process to date is more wasteful, therefore less economic, and greater variability from shipment to shipment is to be expected. Most centrifuged concentrates are produced at 60 to 63% solids content, and the efficiency goes down exponentially as the solids content of the concentrate is increased above 63%. Cream, on the other hand, is now being produced at solids contents between 68 and 70%, and even at such concentration handles about as easily as the centrifuged concentrates. At 68% solids there is a saving of about $62.00 per tank car over a centrifuged concentrate at 61% solids, in shipping from New York to the Middle West.



Coagulation tanks in a smoked sheet plant on one of U. S. Rubber's plantations in the Far East.

There are several latex-concentrating centrifuges on the market, but the majority of plants use the Laval machine produced in Sweden. It is a disc type with a bowl so constructed as to leave a space for the natural sludge present in latex and removed on centrifuging. The particle size distribution in latex is such that in the machines now used 75-90% of the rubber present in the latex is concentrated, leaving a balance in the skim, made up largely of the very small particles and representing 15-20% of the original latex rubber. To remove more of this rubber from the skim fraction into the concentrate requires proportionally much higher centrifugal force, or much slower through-put, because of its small particle size. The point of diminishing returns is therefore between 85 and 90% recovery.

Economic operation demands that this rubber in the skim be recovered, and to date no completely satisfactory economic method of doing this has been worked out, although Firestone is reported to have developed a method in Liberia with which they are satisfied. If the skim is coagulated by acid, a crumbly coagulum is obtained which is very difficult to process economically. Processing can be improved by the addition of 10-20% of fresh latex, but if the product is sheeted and smoked it has a fast cure, is very scorchy, has a high hysteresis loss and poor flex cracking.

The skim can be allowed to coagulate naturally as the result of bacterial action, and the product creped, which gives a better rubber than the sheet, but is still not as good as ordinary market grades. It can be creamed to produce a cream having a rubber content around 50%, and this cream can be coagulated and sheeted without the addition of fresh latex. Alternatively, it can be shipped as a cream. Uses for such products are now being investigated.

Since the preservative used in the latex will distribute itself between the skim and concentrate in proportion to the aqueous phase distribution, the preservative content of the concentrate must be increased after centrifuging, which is usually done continuously. After a final adjustment of preservative content, the concentrate is ready for shipment. It will usually have a viscosity of 40-50 centipoises, a surface tension of 30-40 dynes per cm, a pH around 10-11, and will contain 20-30% of the non-adsorbed non-rubber constituents which were present in the original latex. As prepared, it is, of course, still stabilized largely by protein, but since it also contains practically all of the original soap-forming constituents, the protein is slowly partially replaced by soaps as they are formed, with a consequent increase in mechanical stability.

The process of creaming is basically a much simpler operation than centrifuging but has become considerably more complex as refinements were developed which permitted attaining a higher and higher solids content in the cream.

Fundamentally, creaming is based on the use of certain water-soluble gums and mucilages, which are capable of associating or binding large numbers of molecules of water to each molecule of the mucilage. Since the proteinaceous or soap emulsifiers present in the latex function because of their hydrophyllic character, anything which competes with them for water will

destabilize the latex. The competition in the case of the mucilages is such as to result in a flocculation of the latex globules into flocs of 10-20 microns in radius. This phenomenon has no effect on mechanical stability, since the flocs are reversible, and will completely break up if sufficient water is added to provide an excess above that which can be bound by the mucilage. In fact, the emulsifiers are only partially deactivated by the mucilage, since most of the individual globules in the flocs still show a reduced Brownian motion.

As soon as a floc of sufficient size is formed, it begins at once to rise, and only ceases when it is so closely packed to others that repulsive forces exceed the force of buoyancy. It is a characteristic of this phenomenon that while there is an appreciable distribution of floc sizes, there is no long tail to the curve on the small side, so that there is a definite minimum size with any given concentration and type of mucilage. There is, therefore, a sharp dividing line between the cream as it is forming and the under or serum layer. The rate of rise of this line is that of the smallest and slowest moving floc and if plotted against time a hyperbola results which has an asymptote parallel to the time axis, the asymptote representing the maximum extent of creaming possible under the given set of conditions, after infinite time.

It is a further characteristic of this phenomenon that as the concentration of mucilage is increased, the percentage of rubber flocculated also is increased, so that it is possible to flocculate and thus remove into the cream 100% of the rubber, leaving a completely rubber-free serum. This is the main economic advantage of creaming over centrifuging.

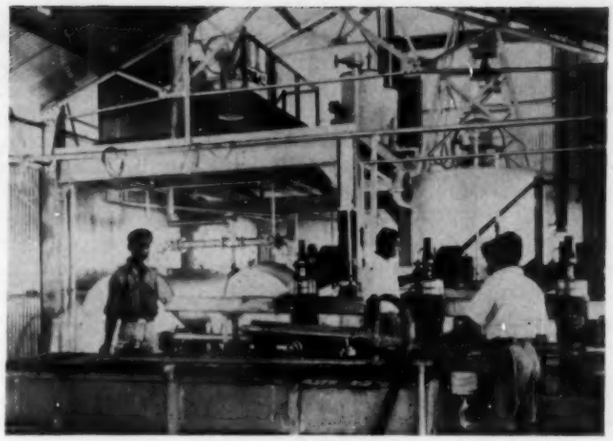
Improvements in Creaming Methods

From this description you will see that a creaming plant is basically very simple. One needs a means of making up a creaming-agent solution from the solid gum, a means of mixing it with latex, and a tank in which to store the latex while it creams, and from which the serum can be drained and discarded when creaming is complete. Such plants are in operation and produce creams of about 60% solids concentration.

The U. S. Rubber Company invested in about ten years research work on this process during the years just prior to the war, and as a result was able to make a number of improvements in the process which are covered by patent. Cream total solids contents are increased, and the wide variation in creamability of different lots of latex is completely eliminated by adding a small percentage of a volatile base soap to the latex. Creaming rates are improved and the cream solids concentrations raised by heating the latex prior to creaming, and by agitating it violently, a result which we attain by centrifugal clarification, which serves at the same time to effect sludge removal.

It has also been found that if creaming is interrupted about at the point of maximum curvature of the hyperbolic creaming curve, and the cream agitated, it will cream further to a higher cream solids concentration, and such an operation is also included in our procedure. Finally, it has been found that serum, because of its ammonia content, is an excellent manure, and it is therefore returned to the soil from which it came.

The cream as shipped has a solids content of 68-70%, a surface tension of 30-40 dynes per cm. and a viscosity of 130-150 centipoises. On dilution to the same solids content of centrifuged concentrate however, its viscosity is usually less than the latter by several centipoises. It contains 15-25% of the non-adsorbed non-rubber constituents which were originally present in the latex.



A section of a new latex concentrating plant recently built by U. S. Rubber in Malaya.

Problems of the Producer

Now as to future possibilities: Let us go back to our old friend, the rubber hydrocarbon itself. The attitude toward customers pre-war was, "There she is, boys, that's what God gave you—take it and like it, or else!" Unfortunately, that attitude still persists in the minds of the crude rubber market operators and many estate managers and directors. Some of us recognize, however, that the one or two million dollars being spent annually on synthetic rubber research, multiplied by say ten years, is a formidable research gun aimed at our head, and laid in train and elevation by some very shrewd research brains.

If we wish to compete, ten years hence, we probably must do something about our unknown friend—the crude rubber hydrocarbon. The synthetic people regularly supply dry rubbers and latex of stated Mooney viscosity. We shall have to learn how. A new low-temperature polymer shows some evidence of improved abrasion resistance over natural rubber, and if this is confirmed in tire road tests it may displace natural rubber for this use. We shall, therefore, have to learn how to improve the abrasion resistance of the natural hydrocarbon. Since GR-S rubber is generally more resistant to oxidation than natural rubber, it is possible that there may be some characteristics of a diene polymer or diene polymerization that makes for decreased oxidizability. It may therefore be possible to alter the oxidizability of the natural hydrocarbon unless increased oxidizability is caused by hyperconjugation of the methyl group. The natural hydrocarbon is still superior to GR-S in tensile strength, resilience, heat build-up, tear resistance, cracking, and other properties, but if the history of natural versus synthetic products competition is any guide, the natural product can only retain this superiority by continued improvement.

These and other similar considerations lead us to the inescapable conclusion that a considerable additional amount of fundamental work must be done in a reasonably short time if we are to stay in business.

It has tacitly been accepted that natural rubber was natural rubber, and nothing could economically be done to improve the hydrocarbon itself. This, incidentally, was the philosophical background for the latex chemist's pre-war pre-occupation with the non-rubber constituents to the exclusion of the rubber. But let us look at this point of view for a moment.

One of the theories of modifier action in synthetic polymerization is that it prevents gelation by reducing

the molecular weight, gelation being caused by cross-linking. Furthermore, properties such as tensile strength are adversely affected not only by this reduction in molecular weight, but also by chain branching, which occurs to some degree in all synthetic polymerization. It may eventually appear that since there are probably few vinyl side chains and little branching in the natural rubber molecule, it has already attained its optimum physical properties and is not improvable. If this is not the case we should know it, which means a more complete determination of structure than has been done, and a careful analysis of the effect of that structure on physical properties. Finally, we shall have to find ways of altering that structure economically.

There are some few indications available that this may not be impossible. In unpublished work carried out in our laboratories before the war, it was observed that if latex is treated with 2% KOH and autoclaved an hour at ten pounds steam pressure, the Mooney viscosity of the rubber, after five minutes milling, was lowered about 12 points even though precautions had been taken to prevent oxidation excepting during milling; and all non-adsorbed non-rubbers had been removed. It was also observed that after removal of 99.9% of the non-adsorbed non-rubber constituents by quadruple centrifuging, the Mooney viscosity of the rubber in the latex, which was preserved with ammonia, rose 11 points in 50 days even though stored under nitrogen during that period.

It has repeatedly been observed that rubber prepared from fresh latex is much more rapidly soluble in solvents than after a month or two of aging. Some of these phenomena are explainable on the assumption of the formation of oxygen crosslinks with age, but they are also explainable on the assumption of molecular weight increase with age, particularly the rise in viscosity of latex rubber aged in presence of ammonia. This points to the possibility that the rubber molecule is still actively growing when the latex is tapped. If so, and since this is the region of growth in which physical properties should be appreciably affected by molecular changes, it may conceivably be possible to control this growth in desired ways.

Theory of Rubber Production

A further point which is even more fundamental may be profitably investigated. It is not inconceivable that natural rubber is actually produced by the polymerization of isoprene, which is produced in infinitesimal amount in each cell, and dimerized or trimerized so rapidly as to prevent loss by vaporization. Dutch chemists who were permitted to continue work in Java during the war claim to have proven this, but their experimental work has so far not been published. If this is true, then there must be some sort of directing mechanism present in the bark which not only insures regular head-to-tail joining of the monomer molecules, but also prevents branching and formation of vinyl side chains without decreasing the molecular weight.

Similar directing mechanisms must be more-or-less common in nature, controlling the regularity of amino acid units in proteins, the regularity of dextro or laevorotatory assymetric carbon atoms in sugars, polysaccharides and sterols, and in other plant and animal substances. If the nature of such a director could be found, and a source of supply obtained, further post-tapping polymerization might be initiated and controlled, or indeed a wide variety of post-tapping copolymerizations with known monomers might also be initiated and controlled.

Goal of the Future

I have attempted to indicate the lines our post-war research on the rubber hydrocarbon might and should take. I hope it is not too "Buck Rogers" a type of project.

Obviously, there is a great deal to be done in the way of development on rubber as now known, and on the present grades of latex—and such development would probably be applicable to any improved hydrocarbon which may be ultimately produced. In the case of the dry grades, the small amount of development which has been done up to the present time has been pointed toward lowering costs and improving appearance, since appearance has been the only criterion of market quality to date. A great deal could be done in improving the intrinsic properties, eliminating variability and applying modern methods of washing and drying, including incorporation of desired compounding ingredients such as carbon black.

Ultimate Aim for Latex

In the case of latex, the ultimate aim of post-war research is to produce economically an emulsion of natural rubber of desired particle size, stabilized by a known amount of a known emulsifier, and containing known amounts of a known stabilizer and antioxidant. Endeavors in this direction must start by eliminating ammonia, since it produces a destabilizing soluble zinc complex ion with zinc oxide compounding ingredients, and must therefore usually be removed by the user before compounding. Bactericides, enzyme killers, and an emulsifier must be substituted. Protein will have to be removed eventually, as may some of the other non-rubber ingredients, particularly those which contribute to water absorption. These endeavors will be the more likely to succeed, the more successful are the complementary efforts to find uses for the various substances removed.

Public Research Essential

I have attempted to give a birds-eye view of the present natural latex industry as well as an estimate of what it will probably have to do to compete with the future synthetic industry. Whether it does so or not will depend, of course, on how successful is synthetic research during the next ten years, and how efficient and well-staffed a research organization the natural industry is able to build up and maintain. To date, the public research is slight comparatively, for whereas the synthetic industry is spending in excess of 1% of its total sales on research, the Malayan research budget amounts to about 0.35% of sales at the present market price of rubber, and this includes the budget of the British Rubber Producers Research Association laboratories in England (but not that of the Ceylon Research Scheme at the Imperial Institute).

Some private research is being carried on, and more is planned, but the industry as a whole can be saved more surely, if adequate public research is carried out. I do not mean to minimize the importance of the work being done in England, for the British Rubber Producers Research Association is doing a splendid job. But I have the impression that their fundamental work, while good, is being carried on at too academic a pace, that they are not all as yet aware that a competitive war is on, and that there is now no time for interesting and important studies which are not specifically directed toward improving the natural product.

Safety in Tire and Tube Curing

By L. E. SODERQUIST

Chief Engineer, McNeil Machine & Engineering Co., Akron 11, Ohio

ON many occasions the following statement has been made: "A vulcanizer is merely an apparatus for the opening and closing of a tire mold." This statement does cover its principal function, but the modern vulcanizer of today performs other functions, including timing, valving of the various elements that make up the cure, and stripping the tire from the mold. It is the combination of these various performances that make the machine more complex.

This discussion deals with the various functions of the vulcanizer and their relation to the safety of the personnel operating the machine. In considering the operator, his functions should be made as simple as possible. Let us start with a tire vulcanizer. The following procedure represents about the minumum routine that should be required of the operator.

Operating Procedure

In the first place, if possible, the vulcanizer should be arranged to open automatically, and as a secondary measure the schedule of operation should be so arranged that the opening takes place when the operator is not in the immedicate vicinity. This will avoid that unexpected accident that may occur when the safety device, that should not, fails. On vulcanizers that require the operator's presence for opening, there is the constant danger of a curing bag exploding or the steam dome opening under pressure, usually causing a serious accident to the operator.

After the opening of the vulcanizer, about the simplest procedure for the operator would be as follows: Disconnect the internal curing bag line, remove the cured tire from the mold, then blow out the mold or dope the mold according to the plant's particular practice. Next, place the uncured tire in the mold, make internal connections and put on the serial number. The operator is then ready to push the closing button or valve as the case may be. After pushing the closing button, he should step away from the vulcanizer to eliminate any possibility of being caught in the closing machine: All secondary operations such as the closing of the mold and the immediate opening again for inspection should be avoided as it adds to the number of functions required of the operator, and therefore tends to confuse him. In the same sense the practice of opening and closing the press for rimming of the bead should be carefully avoided.

These are, briefly, the functions required of the operator and although they seem simple, danger lurks in most of them.

Consider the removing of the cured tire. If hand connections are used there is always the possibility of the operator burning himself by breaking the connections while sufficient pressure exists in the bag. This danger is not so apparent in the automatic connectors for there the connection breaks itself. This one point alone makes the automatic connector far more advisable, particularly on passenger size presses.

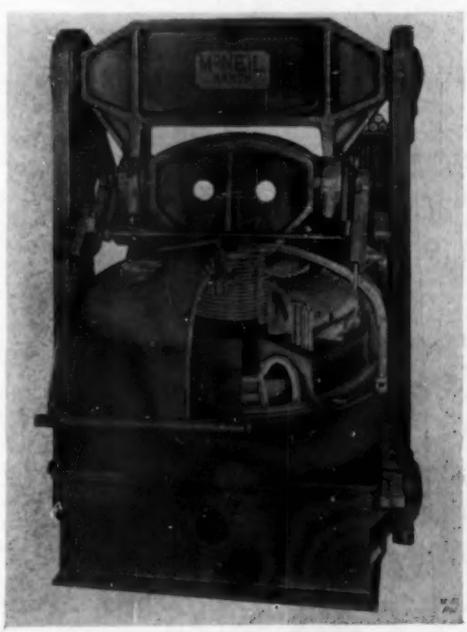
Doping of the mold represents a hazard in that the splash of the dope from the hot mold will burn. This is particularly true where swabs are used.

The closing of the vulcanizer, if handled properly, should not represent much of a hazard, but when not handled properly it can be of the most serious nature. It is essential that all operations on the uncured tire should be complete before the closing button or valve is pushed. In many plants we have seen serial numbers placed on the tires while the vulcanizer is closing. We have seen hand connections made while the vulcanizer is closing, and in one instance saw tires laid during the closing operations. It is doubtful whether these practices have the approval of any safety committee but nevertheless they have been done.

Vulcanizer Design

So much for the various duties required of the operators. Let us see what the manufacturers of the vulcanizer has done to make the unit a safe machine to operate. He is the one that can make or break all plans for safe operation.

One of the first requirements in the design of a vulcanizer, whether it be tire or tube, is that it have sufficient strength to hold the mold together when the maximum mold size is loaded to the maximum bag or



Cutaway sectional view of one of the type of vulcanizers described. This unit has a loading capacity of 800,000 lbs. and will handle tire molds up to 70 inches in diameter and 24 inches in thickness.

tube pressure. Not only should it have sufficient strength to hold the molds together, but good engineering practice dictates that the unit should have a safety factor of at least five. In other words, all vital parts that enter into the holding of the mold closed should have an ultimate strength of five times that required under normal operations. With modern mathematical formula and strain gage equipment there is no reason why the manufacturer cannot meet this requirement.

There are several ways to accomplish the necessary holding of the mold together but perhaps the most popular and widely used is the power driven toggle type. This method has proved popular because it offers an inexpensive way of accomplishing lots of squeezing load.

The two types of toggles used are the overlocking type and the outward pressure type. As the toggle comes to a straight line, analysis will show that the load approaches infinity. Due to the fact, however, that the bearings in the linkage absorb a certain amount of friction and all metals stretch or compress under load, the actual physical load a linkage will produce does not approach infinity but it does build up rather rapidly.

Figure 1 shows a linkage in combination with a load curve taken from an actual test. Note how rapidly the curve goes up and how important the point of pick up of load is, because this determines the ultimate load. This fact is one that users of vulcanizers should be familiar with, for if it is not used wisely it can become a detriment to safety.

For example, consider a vulcanizer designed to hold a load of 400,000 pounds. Originally, all the parts were designed to hold the mold together with a safety factor of 5. However, it was subsequently found that for some reason, such as lifting the load of the mold at some unfavorable point in the linkage, that a certain size motor or hydraulic cylinder was required. Once this motor or cylinder was added, the vulcanizer performed well, and it cured tires or tubes without any apparent overflow. However, unknown to the designer, the motor or cylinder added was capable of producing a squeeze on the mold of approximately 1,000,000 pounds. Thus, the

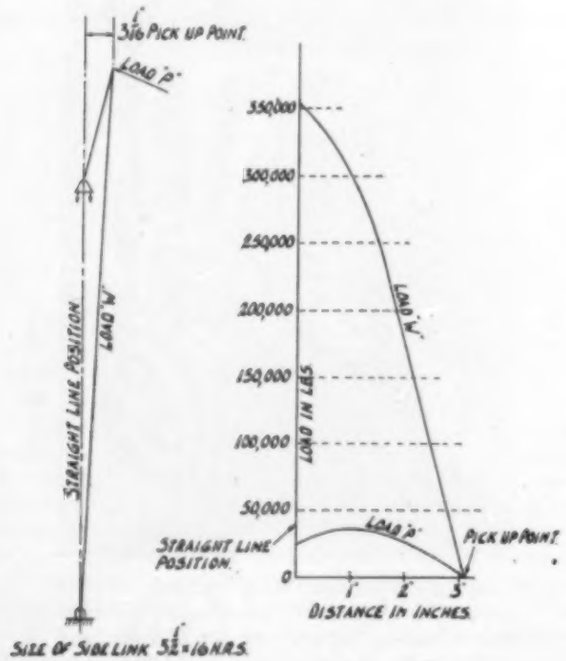


FIG. 1—Linkage load curve.

safety factor was cut to 2. It might be argued that some safety factor remains, but unfortunately a 2 factor means in this case that the metal in the vulcanizer will be highly stressed and fatigue must be remembered. Fatigue means exactly what it implies, and while metals at high stress may not give way on the first day of operation, they will eventually get tired and break.

The point that the vulcanizer user should make certain of is that the press is capable of the load that the manufacturer claims for it, and even so it cannot be overloaded. There are vulcanizers in the field today which are being greatly overloaded.

Closing Safeguards

It has been long realized that fast closing machinery in which there is a possibility of a person getting caught needs some sort of a safety device to protect the operator. The only fast moving vulcanizers are those used in curing tubes. Some of the modern vulcanizers close in 2½ to 3 seconds. For the past eight years the majority of tube vulcanizers have been furnished with a safety bar that precedes the mold and which is so arranged that if any parts of the operator's person or clothing is caught in the mold closing area the bar preceding the mold will hit the object and immediately stop or reverse the vulcanizer. This method has been very successful and has prevented many accidents.

Tire vulcanizers, on the other hand, are relatively slow in closing, taking from 15 to 30 seconds, depending on the size of the vulcanizer. To provide a safety bar on such slow moving machines was not believed necessary; however, a fatality about a year ago in one of the largest and slowest moving vulcanizers changed the thinking on this matter and today it is considered good practice to have safety bars on all vulcanizers.

Pressure Safeguards

Perhaps the most frequent accident on vulcanizers is the burning of the operator due to the vulcanizer opening while pressure still exists in the curing bag. To overcome this hazard, Maynard, back in 1935, patented a combination whereby he used a pressure switch on the pipe line to the curing bag similar to that shown in Figures 2, 3 and 4. The idea of this pressure switch was to disconnect the power source for opening the press as long as pressure existed in the pipe line. This method has been universally adopted and practically all of the existing tire vulcanizers today use some adaptation of this pressure switch combination.

The combination, however, has a very weak point in that it measures the pressure in the pipe line and not necessarily in the curing bag. All curing bags are fed through a stem similar to that on an inner tube and this stem has a very small opening. The opening is usually the smallest in the line and has a tendency to plug from refuse in the curing bag. Since the stem must be located between the bag and the feeding pipe line (in which the pressure switch is located), its plugging means that the bag may have as much as 350 pounds of pressure, while no pressure exists in the pipe line. This condition is indicated in Figure 4. Consequently, the vulcanizer can open with full pressure in the bag causing a bad explosion. Another drawback of this type of safety is that there is not a pressure switch on the market today that will operate on pressures as high as 350 pounds and then have any sensitivity for the lower pressures.

As curing bags are necessary and must be fed pressure by means of a valve stem, getting some sort of a

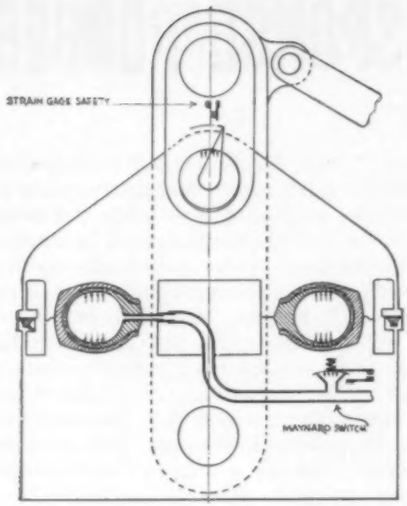


Fig. 2—Vulcanizer closed, with pressure in bag.

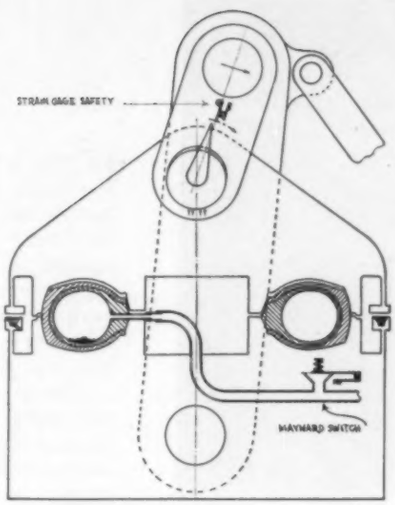


FIG. 3—Vulcanizer opening, no pressure in bag.

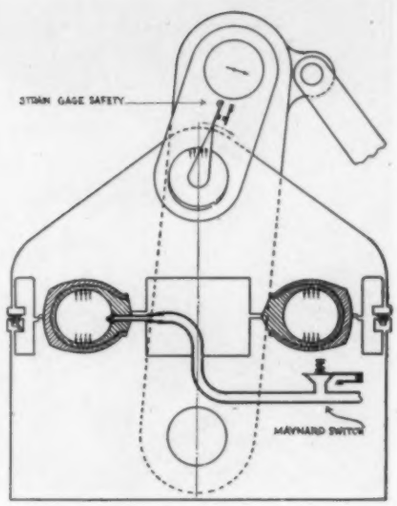


FIG. 4—Vulcanizer opening, with pressure in bag.

safety device that would react to the pressure in the bag rather than the pipe line has presented quite a problem. The study of this problem has resulted in the development of the strain gage safety.

As the loading on the vulcanizer is a true representation of the condition of pressure in the curing bag it is possible to gage this pressure by the load on the vulcanizer linkage. The strain gage safety in its present form becomes an integral part of the vulcanizer and prevents it from opening as long as any pressure exists which tends to separate the mold, regardless of its nature.

Operation of Strain Gage Safety

To comprehend the working of this strain gage safety, refer to Figures 2, 3 and 4. These diagrams show a typical press linkage with the tire and cured bag in place. They also incorporate both the Maynard type safety and the strain gage safety.

Figure 2 shows the vulcanizer in the closed position with full pressure in the curing bag. The strain gage safety is connected with the two parts that form the bearing and shaft immediately above the mold. For clarity, the drawing shows an exaggerated condition of the clearance in this bearing. Actually, in a machine it is in the order of about .015 inches. As the linkage is holding the vulcanizer closed under pressure the clearance in the bearing is on the lower side while the top of the bearing is tight and under pressure.

The same vulcanizer is shown in Figure 3 as it is opening after finishing its cure. The pressure in the bag has been fully exhausted and there is nothing to prevent the press from opening. Due to the fact that the linkage must now pick up the top mold, the load on the bearing has been reversed and the clearance now is on the top of the bearing. The shifting of the clearance has allowed the electrical switch that is attached to the top link to raise sufficiently so that in its movement it misses the arm that is attached to the shaft. This electrical switch is attached to the power means and if its contact is broken the press will stop.

Figure 4 depicts what happens when the press starts opening with pressure still in the bag. In the first place, assume that the valve stem has become plugged and the Maynard type switch is therefore inoperative and the press has started to open. Due to the fact that pressure exists in the curing bag the linkage is still under load; there is no reversal of load and no change in the clearance and the condition of the bearing is the same as in Figure 2. The switch attached to the top link does not raise and in its opening movement it interferes with the arm, breaking the contact to the motor and stopping the vulcanizer.

It is true that in order for this design to work the press must open slightly, but since the tire casing and bag are of very heavy construction this slight opening is not sufficient to cause the bag to explode. If the valve is plugged 100% it is impossible to release the pressure in the bag. The next move is to get everyone at a safe distance and open the press by others means.

This switch is being rather widely adopted. Its only real disadvantage is that it is very sensitive to low pressure, and in many plants sufficient pressure remains in the exhaust lines to operate the switch.

An attempt has been made to make the diagrams as clear as possible and in order to do so it was necessary to reverse the positions of the switch and the operating arm from that which exists in the actual strain gage switch. However, the general operation remains the same regardless of the reversing of these parts.

Mold Changing

Before closing there is one other safety practice that should be mentioned. It is in reference to the mold changers. In all plants a group of men are responsible for the placing of molds in the vulcanizers. In the majority of molds today the top half is held in the press by means of bolts or cap screws. We have found in our visits to various plants that the mold changers are lazy. They do not sufficiently tighten the top bolts that hold the mold in place. In some instances they use washers under the bolts to the extent where only one or two threads on the bolts enter the mold. This is a dangerous condition and warrants the immediate attention of all safety men.

Note: This paper was presented at the Symposium on Safety in Curing Operations held by the Rubber Section, National Safety Council, Chicago, Ill., October 6, 1947.

SPONGE RUBBER

1—One of the first steps in the production of rubber terrain models is to convert the contour lines of the map used as a guide into solid, three dimensional forms. Here, the contours which represent the interval by which the model rises to depict the increase in elevation are cut out.

IT was amply demonstrated in World War II that rubber terrain models were necessary aids to naval and military operations in briefing air bombardment crews, in tactical planning, and in landing operations. Hundreds of these miniature models were constructed of the Normandy coasts and of such islands as Kiska, Saipan, Guam and Iwo Jima. The need for relief models did not end with the war and they are still needed for training purposes.

The first step in the preparation of a rubber terrain map is to determine the area to be covered and to assemble the necessary intelligence. To construct an accurate terrain model, a careful stereoscopic inspection is made of photo pairs. When the original terrain model has been completed, plaster is brushed

2—Elevation is represented by layers of heavy cardboard similar to terraced land, each thickness representing a rise of a certain number of feet or meters. These contours are secured with rubber cement and tacked to hold the model rigid.

3—The space between the cut contours is filled in with modeling clay to form an accurate reproduction of the changes in elevation. A modeling tool is used for this purpose.

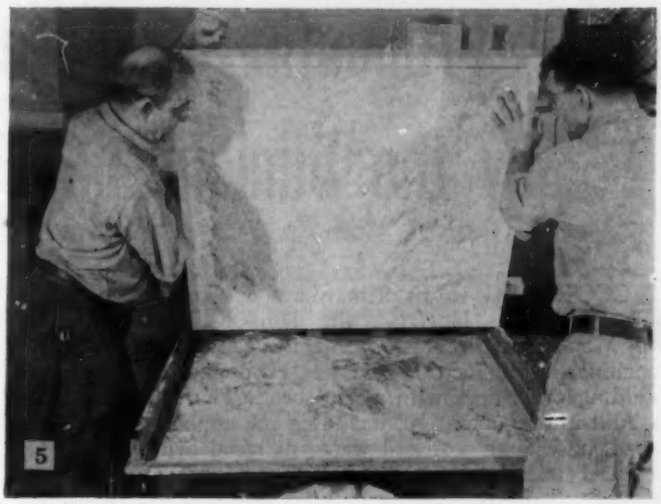
4—After cultural detail, such as city patterns and textures to simulate vegetation, railroads, highways and waterways are placed upon the model, a splash coat of plaster is applied.

RELIEF MODELS

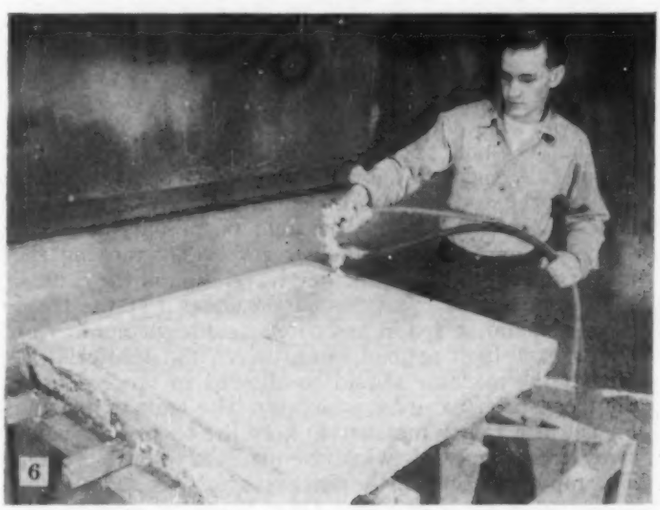
on to the model and scrim is laid into the plaster. When the negative plaster cast has been lifted off the original model, the mold is ready for the preparation of rubber terrain models.

The color of the earth and vegetation are carefully simulated on the rubber terrain models to correspond with the hues of nature and to the scale of the relief map. After the mechanical process in the production of the rubber terrain map has been completed, the model is completely checked and corrected before shipment to military training centers where young fliers and troops have an opportunity to study relief models and miniatures.

All illustrations used are official U. S. Navy photographs.



5—Plaster is next brushed on the original terrain model and scrim is laid into the plaster. Reinforcing ribs made of burlap dipped in plaster are anchored into the casting and to a wooden frame to add strength and to facilitate handling. The negative plaster cast is then lifted off the model, as shown here, and is painted and prepared for mass production of rubber terrain models.



6—Several coats of rubber latex are then sprayed on the negative plaster cast. Each coat is allowed to dry before the next application.

7—Foam rubber is next poured over the thinly coated plaster negative. The foam rubber is then struck off even with the edges of the form. Each step in the process is checked.

8—The sponge rubber relief map is cured in a steam oven for 24 hours at 180° F. When pulled away from the plaster negative, a perfect scale model of the original is the result.

Production of Wired-On Cycle Tires by the Dunlop-Shaw Monoband Process

ACCORDING to Francis Shaw & Co., Ltd., Manchester 11, England, the Dunlop-Shaw patented Monoband Process, which utilizes the Monoband machine, is the fastest and most economical method of building cycle tires with a wire bead. The complete tire is built in one operation, including the application of the tread, and labor cost and waste material are said to be reduced to a minimum. The Shaw concern sells the Monoband machine on an outright, non-royalty basis.

The fabric used for the carcass of the tire in the Monoband process must be of the weftless type, or a fabric having three to four picks of a fine count per inch to hold the warp together during the preliminary processing. The fabric should be coated on one side on a spreading machine and topped on the other by means of a calender, or both operations may be performed on the spreader. During this process the wefts mentioned above will be broken and the warp will be held together by the rubber.

The roll of rubber-coated fabric is then fed to a slitting machine where it is split up into small rolls of a width to suit the tires to be produced. The smaller rolls are then taken to a spool wrapping machine where the fabric is wound onto spools to fit the Monoband machine, each spool holding sufficient fabric to make three or four tires, according to the type and weight of fabric. Standard slitting and spool wrapping machines may be used for these operations. A spool wrapping machine offered by the Shaw concern is fitted with a measuring device to ensure that only sufficient fabric is wound on each spool to make the specific number of tires desired.

The fabric used for covering the bead wires must be of the same type as that used for the carcass but of a lighter weight. After being processed in a similar manner as the carcass fabric, the rolls of bead wire fabric are subdivided on a wire fabric slitting machine for use on the bead wire covering machine. Here again standard machines may be utilized. One standard bead wire fabric slitting machine on the market slits sufficient fabric to cover 3300 bead wires per hour (1650 tires). For purposes of economy, the bead wire covering machine should be able to cover two bead wires at each operation. The drums used on this machine should be similar to those used on the Monoband machine.

The tread stock can be produced either by extrusion or by means of a profile calender and is wound direct onto rolls ready for use in the Monoband machine by means of a tread batch-up gear. It is recommended that the tread from the profile calender or extruder be passed through a cooling tank and then onto a conveyor of sufficient length to ensure complete drying of the tread before being fed to the batch-up gear. Once the tread stock is rolled up in backing cloth on the batch-up drums it is ready for feeding to the Monoband machine.

The Monoband machine is depicted in Figure 1. It is driven by a 1 h.p. motor mounted in the base. The power from the motor is transmitted by V-rope to a shaft which drives the driven drum (A) and the spool wheel (B). The driven drum (A) is fitted with interchangeable sleeves which are changed for different sizes of tires and are grooved differently to accommodate the various casing widths. The idler drum (C) also has interchangeable sleeves, but these are of constant diameter and are only changed where a different casing width is required.

The idler drum (C) is mounted on a sliding head operated by a double acting compressed air cylinder which puts tension on the wires during the wrapping process. To obtain the required number of wraps, a set of three change wheels are provided to drive the spool wheel (B), this spool wheel being slotted to allow the wires to be placed in position and the finished casing removed. Mounted on the spool wheel (B) is a spool holder (D) which is adjustable to obtain correct angle for wrapping the fabric.

In operation, the bead wires are placed on the drums (A and C) and tension applied by means of the air cylinder. A spool of fabric is then placed on the spool holder (D) and the fabric led around the wires. The handles (E and F) and the foot pedal (G) are then depressed and the spool holder revolves, wrapping the fabric around the wires as they travel around the drums.

When the fabric has passed the roller (J) the tread rubber should be fed in and after a sufficient number of wraps have been applied to the wires, the fabric is cut off but the machine should be allowed to proceed until the tread rubber can be joined up. The handles (E and F) act as a safety measure to keep the operator's hands away from the wires while the machine is in operation. To stop the machine, the friction clutch is released by pressure on the foot pedal (H). Standard presses can be used for vulcanizing.

The average production from the Monoband machine is between 60 and 70 casings per hour, but skilled operators have been known to produce as many as 80. The air pressure required for operation of the machine is approximately 30 pounds per square inch.

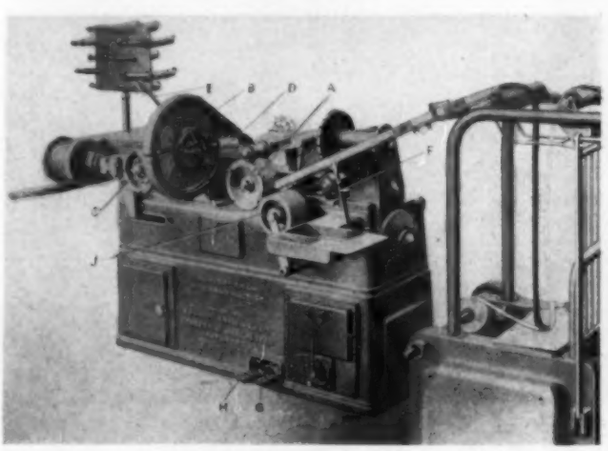


Figure 1.

Note: All data and photographs for this article were supplied by Francis Shaw & Co., Ltd., Manchester 11, England.

Division of Rubber Chemistry, A.C.S., Meets in Chicago on April 21, 22, 23

THE Spring Meeting of the Division of Rubber Chemistry, A.C.S., will be held at the Hotel Sherman in Chicago, Ill., on Wednesday, Thursday and Friday, April 21, 22 and 23. The meeting will be held in conjunction with the 113th National Meeting of the parent society.

The Division meeting will feature the presentation of 28 technical papers, a business meeting, and the regular banquet, which will be held in the Hotel Sherman on Thursday evening, April 22. The Suppliers Cooperative Cocktail Party, which has proved to be a popular event, will again precede the banquet. The business meeting will be held during the technical session on Thursday morning, April 22.

Technical sessions will be held on Wednesday afternoon, Thursday morning and afternoon, and Friday morning. Once again presentation of papers has been grouped by subject for convenience of those attending the meeting. The session on Wednesday afternoon will be devoted largely to papers on polymers, Thursday morning on carbon black, Thursday afternoon to testing developments, and Friday morning to compounding.

Abstracts of the 28 scheduled papers, together with the authors and their company connections, follow:

Program of the

DIVISION OF RUBBER CHEMISTRY
AMERICAN CHEMICAL SOCIETY

Hotel Sherman—Chicago, Ill.
April 21, 22 and 23, 1948

Wednesday Afternoon—April 21

2:00 P.M.—Introduction by Harry E. Outcault (St. Joseph Lead Co.), Chairman, Rubber Division, A.C.S.
2:10 P.M.—General Papers.

Thursday Morning—April 22

9:00 A.M.—General Papers.
10:55 A.M.—Business Meeting.
11:15 A.M.—General Papers.

Thursday Afternoon—April 22

2:00 P.M.—General Papers.

Thursday Evening—April 22

6:00 P.M.—Cocktail Party.
7:00 P.M.—Divisional Banquet, Hotel Sherman.

Friday Morning—April 23

9:00 A.M.—General Papers.

ABSTRACTS OF PAPERS

Wednesday Afternoon—April 21

2:10 P. M.—Solvent Polymerization of Isoprene and Styrene-Isoprene with Tert.-Alkyl Peroxides. ***Lloyd H. Perry (Union Bay State Chemical Co., Cambridge, Mass.).***

Tert.-butyl hydroperoxide and several of its derivatives have been studied as catalysts for the preparation of low molecular-weight polyisoprene and styrene-isoprene copolymer. The polymerizations were carried out at 80° C. to 130° C. in pressure reactors for periods of 20 to 96 hours and the products were tested for yield and intrinsic viscosity.

Solvent polymerizations of isoprene gave 70 to 95% yields of polyisoprene which had intrinsic viscosities ranging from 0.15 to 0.65 depending on conditions. The clear, nearly colorless polymers dissolved readily in aromatic and chlorinated solvents to give extremely stable solutions. The usual effects of monomer concentration, temperature, nature of solvent, etc., on the polymerization were found. Tert.-butyl peresters and di-tert.-butyl peroxide tended to form gels much more readily than tert.-butyl hydroperoxide, even though the latter shows stronger peroxidic properties.

The styrene-isoprene copolymer study was limited to the high styrene ratios which yielded resinous products. By polymerizing a 2 to 1 ratio of styrene-isoprene in naphtha with tert.-butyl hydroperoxide, a clear colorless resin with an approximate molecular weight of 2500 was prepared in 95 to 98% yields in 20 hours. The molecular size and melting point of the resin can be changed at will over a rather large range by choice of solvent, temperature of polymerization, nature of peroxide and isoprene-styrene ratio. The effect of the various factors was similar to that observed with isoprene alone.

A few polymerizations with benzoyl peroxide indicated that it did not give results comparable to the tert.-butyl peroxides in the above systems.

Work done at Newport Research Laboratory by special arrangement with Newport Industries, Inc., Pensacola, Florida.

2:35 P. M.—The Effect of Low Polymerization Temperatures on Some Properties of GR-S Vulcanizates. ***L. H. Howland, W. E. Messer, V. C. Neklutin, and V. S. Chambers (U. S. Rubber Co., Naugutuck, Conn.).***

The effect of polymerization temperatures below 30° C. on the physical properties of the vulcanizates of GR-S type polymers has been studied for several years. Some years ago it was found that polymerization temperatures down to 10° C. would give a copolymer with better processing and at the same time produce vulcanizates that have better stress-strain properties and more resistance to flex crack growth, tear and abrasion than with the 50° C. standard GR-S.

The early formulas resulted in extremely long reaction times so temperatures were not carried below 10° C., but definite trends in physical properties with polymerization temperature were found. More recently faster formulas have been developed and polymerizations have been carried out at sub-freezing temperatures in the presence of an antifreeze in nearly normal reaction times. Polymerizations have been carried out in pilot plant reactors after preliminary runs in bottles and several polymers have now reached the production stage.

A readily processible butadiene-styrene copolymer prepared at 5.0° C. gave a vulcanizate that had 29% better unaged tensile, 18% better aged tensile, 53% better hot tensile and 450% better flex life than a corresponding GR-S-10 stock.

3:05 P. M.—Polymerization of Various Monomers in the Buna S-3 System. ***D. N. Marquardt, R. H. Poirier, and L. B. Wakefield (Firestone Tire & Rubber Co., Akron, Ohio).***

A butadiene-styrene polymer produced in the Buna S-3 system with materials available in this country is a very stiff poly-

mer which could be heat-softened to any desired plasticity. The most distinctive differences between the Buna S-3 polymerization system and GR-S were the use of an alkylnaphthalene sulfonate emulsifier, limited modification with Dixie, and the recovery of the polymer at lower conversion. A tread wear about 50% better than GR-S has been obtained with a polymer prepared in the S-3 system.

In view of these interesting results, the Buna S-3 polymerization system was applied to the preparation of polybutadiene, polyisoprene and copolymers of these monomers with styrene, monochlorostyrene and dichlorostyrene. The resultant polymers were, in most cases, found to be superior in their cut growth resistance to similar polymers prepared in the GR-S recipe. The monomers maintained the same relative rates of polymerization although polymerization was somewhat slower in the Buna S-3 than the GR-S recipe.

3:25 P. M.—Preparation and Properties of Cyclorubber. *A. H. Krause, H. F. Scott, and A. G. Susie (Marbon Corp., Gary, Ind.).*

A brief historical development of thermoplastic rubber isomers and their properties is presented. Several methods of preparation are mentioned. Preparation and properties of a typical commercial cyclorubber, Marbon-B, are given, together with its application in the field of moistureproof coatings as a hot melt component and in lacquers. Its use in paints, electrical insulation, printing inks and adhesives is also discussed.

3:50 P. M.—Alkyl Phenols as Nondiscoloring Antioxidants for Synthetic Rubber. *Leland J. Kitchen, Harry E. Albert, and George E. P. Smith, Jr. (Firestone Tire & Rubber Co., Akron, Ohio).*

Synthetic elastomers which are manufactured by copolymerizing butadiene with other monomers such as styrene or acrylonitrile frequently contain 1 to 2% of a stabilizing agent such as phenyl-*beta*-naphthylamine, an antioxidant which tends to discolor and render the synthetic rubbers dark in color. In a search for suitably effective nondiscoloring antioxidants, alkyl phenols were examined as antioxidants for copolymers of butadiene with acrylonitrile and with styrene (GR-S). The study revealed that alkyl phenols impart protection to polymers and vulcanizates without discoloration. The degree of protection varied widely, depending on the number, structure, and location of substituent alkyl groups.

In butadiene-acrylonitrile copolymers, the alkyl phenols ranged in effectiveness from materials, such as *p-tert.*-alkylphenols, which gave only a fair degree of protection against aging, up to certain 2,4,6-trialkylphenols which imparted outstanding age resistance. Exemplary of the latter materials are 2,4-dimethyl-6-isobornylphenol, 2,6-di-*tert.*-butyl-4-methylphenol, and 2,6-di-*tert.*-octyl-4-methylphenol. In general, the 2,4-dialkylphenols and 2,4,6-trialkylphenols which contained methyl as the *para* substituent were superior to similar or isomeric alkyl phenols which contained larger *para* substituents or *meta* substituents.

In GR-S, the same 2,4,6-trialkylphenols were effective nondiscoloring antioxidants. However, differences in antioxidant activity were not as great in GR-S as in the N-type polymers, particularly in white stock vulcanizates where the variations in the ordinary aging tests were rather small. Differences in order of activity were noted between antioxidants in GR-S polymer and vulcanizates. In GR-S, the nondiscoloring antioxidant effectiveness was substantiated by natural weathering and by oxygen absorption measurements.

4:15 P. M.—The Vulcanization of Neoprene With Antimony Trisulfide. *Maynard F. Torrence (E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).*

A new method of vulcanizing neoprene to obtain compounds having high resilience, low heat build-up and low set is discussed. The stress-strain relationship of the vulcanizate differs from that of a conventional neoprene compound, since the modulus at low elongation is less in relation to that at high elongations than is normally obtained. The hardness is lower than would be expected for a stock having as low a set and as high a resilience. These effects are accomplished with little increase in scorching tendency by the use of small amounts (.125 to 0.50 part on 100 parts of neoprene) of antimony trisulfide. All of the various polymorphous forms of the sulfide are equally effective. The antimony sulfide is effective both in the presence and absence of the normally used oxides of zinc and magnesium. Data are presented comparing the new compounds with conventional neoprene stocks and those accelerated with Permalux (di-ortho-tolylguanidine salt of dicatechol borate).

4:35 P. M.—Effect of Light on Neoprene. I. Discoloration of GR-M Vulcanizates by Direct Sunlight. *P. A. Sanders (E. I. du Pont de Nemours & Co., Inc., Wilmington, Del).*

Vulcanized white GR-M stocks discolor differently in direct sunlight than in an accelerated light aging unit. It is, therefore, impossible to predict the discoloring effects of direct sunlight by means of standard accelerated light aging tests.

The initial effect of outdoor exposure to direct sunlight on white GR-M stocks is a bleaching that takes place in the first few hours of exposure. This is followed by a yellowing that reaches its maximum in one to two weeks. On continued exposure up to six months the yellow color diminishes, owing to a further bleaching which tends to make the sample gray in color.

In accelerated light aging tests the discoloration proceeds continuously from white to yellow and finally to a dark brown. No appreciable bleaching is observed. The rate of discoloration is rapid and exposures of eight hours may give more discoloration than that produced in six months under outdoor conditions.

The effect of such variables as the curing time, nature and amount of white pigment, and the presence of selected antioxidants on the discoloration during natural and accelerated light aging is shown.

Thursday Morning—April 22

9:00 A. M.—Rubber Reinforcing Properties of High Abrasion Furnace Black. *L. R. Sperberg, J. V. Svetlik, and L. A. Bliss (Phillips Petroleum Co., Bartlesville, Okla.).*

Highly reinforcing furnace blacks became available in commercial quantities during 1947. The properties of a high abrasion furnace black when compounded in rubber are presented in this paper and are compared to the properties of representative blacks of the SRF, HMF, and EPC types. Detailed rubber data, including stress-strain characteristics, at normal and elevated temperatures, oven-aged stress-strain characteristics, heat build-up, resilience, flex life, compression set, abrasion resistance, and milling and extrusion characteristics, are presented at variable black loadings in both natural and GR-S rubber for the four different types of blacks.

Numerous road tests on Phillips Petroleum Company test vehicles have shown that this high abrasion furnace black is from 10 to 20% superior to EPC black in abrasion resistance as well as being markedly superior in its resistance to chipping and cracking. The superior reinforcing properties of HAF black are illustrated in "bound" rubber figures which show that it not only attracts more rubber to its surface but holds it more tightly than EPC black.

9:25 A. M.—Processing Characteristics of Reinforcing Furnace Blacks. *E. M. Dannenberg and C. A. Stokes (Godfrey L. Cabot, Inc., Boston, Mass.).*

Reinforcing grades of carbon black made by the furnace process are now commercially available in abundant supply. This situation is in sharp contrast to the existing shortages of channel type blacks. The substitution of these furnace blacks for channel blacks in recipes originally designed for channel blacks has resulted in the furnace blacks being characterized as promoting fast curing and scorching, particularly when used in natural rubber tread recipes. It has also been observed that a number of the furnace blacks are superior to the channel type blacks in their effect on processing. This paper discusses the curing and scorching properties of furnace blacks and describes an extrusion shrinkage test which has proved useful for judging processing properties.

The compounding procedures which result in a change in curing rates are the following: sulfur-accelerator loading variations, incorporation of acidic retarders, and the use of accelerators other than MBT or MBTS. Although only relatively small effects on scorching can be attained using low sulfur and low accelerator (MBTS) loadings, the use of other accelerators and retarders can be very pronounced.

An inherently slow-curing furnace black can also be made,

and data are presented showing that the direct substitution of this type of black for channel black in a natural rubber-MBT accelerated tread recipe is not accompanied by fast curing and scorching. The production of this reinforcing furnace black possessing the curing properties of a channel black involves a modification of the furnace process adding to the cost of the product. In general all these procedures do not have any deteriorating effect on the physical properties of the final rubber compositions.

9:45 A. M.—Acceleration of Fine Furnace Black Compounds. *O. H. McCollum (E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).*

Fine furnace black, a recent development in carbon black technology, presents definite scorch problems, especially when used as a replacement for channel black in tire tread stocks. The degree of scorching can be reduced by (1) Use of chemical retarders, (2) Reduction in accelerator concentration, and (3) Reduction in sulfur concentration. Chemical retarders alone are insufficient, and must be augmented by a decrease in accelerator and/or sulfur. Reducing accelerator sacrifices modulus, resilience and, most important of all, age resistance for the benefit of processability. Reducing sulfur improves aging and scorch resistance, and through proper acceleration the effects on other physical properties, i.e., modulus, hardness and resilience, can be minimized. A high-modulus, age-resistant accelerator permits lower sulfur concentrations, resulting in further improvement in scorch resistance and relatively normal hardness and resilience on aging. In a fine furnace black tread, accelerator and sulfur contents are varied, showing the effect on modulus, resilience and scorch. A standard channel black tread is used as a control.

10:10 A. M.—Carbon pH and Structure in Rubber Compounding. *H. A. Braendle, H. C. Steffen, and J. R. Sheppard (Columbian Carbon Co., Brooklyn 32, N. Y.).*

The new furnace carbons available to the rubber compounder today have, in effect, added two new ingredients for his recipes, namely, high pH and carbon structure. In addition to selecting a carbon black on the basis of its fineness of specific surface, the effects of structure and pH on processing, curing and physical properties must be carefully weighed by the compounder. Alternative methods of obtaining good processing in GR-S are discussed. The consequences of high pH in both GR-S and Hevea are reviewed and suggestions for capitalizing on this property are made.

10:35 A.M.—Safe Acceleration for Use with the Fine Particle Size, Reinforcing Furnace Blacks (2, 4-Dinitrophenyl Benzothiazyl Sulfide). *F. L. Holbrook and B. A. Hunter (U. S. Rubber Co., Naugatuck, Conn.).*

The newer fine furnace carbons are of increasing interest because of their excellent reinforcing properties in rubber and because of the potential economy of their production as compared to channel blacks. These blacks, variously referred to as reinforcing furnace (RF) or very fine furnace (VFF) blacks, are characterized by their lower acceleration requirement and by a pronounced tendency to scorch at normal processing temperatures. The scorchiness problem is particularly critical in natural rubber stocks, and a need is indicated for much safer accelerators than are now offered to the rubber compounder.

Attempts to meet the scorching difficulty by decreasing the amount of conventional accelerator have not been entirely effective, not only because scorchiness is not adequately lessened thereby, but also because stocks cured with a deficiency of accelerator show definite symptoms of "accelerator starvation" or are evidenceu by low tensiles, lack of rebound, lethargy in modulus development, and poor heat-aging characteristics.

2,4-Dinitrophenylbenzothiazyl sulfide has been found to be a very effective and unusually safe accelerator for natural rubber stocks reinforced with the new furnace blacks. Data are presented comparing the cure, scorchiness, and aging properties of 2,4-dinitrophenylbenzothiazyl sulfide with bis-(benzothiazyl) disulfide and N-cyclohexylbenzothiazole sulfenamide in a fine furnace black natural rubber tread stock. The excellent aging properties of 2,4-dinitrophenylbenzothiazyl sulfide is thought to be associated with the fact that a comparatively large proportion of thiazole can be incorporated in this form without danger of scorch.

11:15 A. M.—The Tackiness of Butyl and Natural Rubber. *L. M. Welch, R. K. Beckwith, J. F. Nelson, A. L. Chaney, and E. A. McCracken (Standard Oil Development Co., Baton Rouge, La.).*

A comparative study of the tackiness of butyl and natural rubber was made using a tackmeter similar to that described by W. F. Busse, et al. [*J. Applied Physics,* Vol. 17, p. 376, (1946)]. Since the primary objective was to obtain some basic information on the factors involved in butt-splicing of inner tubes, the tackiness measurements were made on freshly cut surfaces of cylindrical samples which were contacted under various time-temperature-pressure conditions. The reproducibility of the test was surprisingly good with the average deviation being less than 10%.

The temperature of the knife used to cut the samples was found to be of primary importance. The tackiness of butyl compounded with 50 parts of SRF black (no curatives) decreased regularly with increasing knife temperature over the range 80° F. to 500° F., whereas natural rubber showed an increase in tackiness with increasing temperature. At about 500° F., the knife temperature presently employed in butt-splicing machines, butyl showed tack values of about 30 p.s.i. compared to about 60 p.s.i. for natural rubber. On the other hand, the tackiness of butyl was about 50 p.s.i. compared to 35 p.s.i. for natural rubber when the samples were cut at 80° F. knife temperature.

Increased time and increased pressure of contact favor better splicing of butyl and natural rubber as would be expected. Butyl samples cut with a cold knife were effectively spliced by contacting for six seconds at 50 p.s.i.; increasing the pressure or time above this had very little effect on butyl due to its limiting stock strength (about 55 p.s.i.). The measured tackiness of natural rubber continued with increasing pressure and/or time up to 65 or 70 p.s.i. pull, at which value the samples would tear from the clamps. The ultimate stock strength of natural rubber at room temperature is therefore much higher than that of butyl.

The stock strength and also measured tackiness of butyl was influenced by the type of black with values ranging from 56.6 p.s.i. for E.P.C. (Wyex) to 38.1 for M.T. (Thermax). Paraffin wax and stearic acid, when present to the extent of three parts per 100 parts of polymer, decreased the tack of butyl about 40 to 50%. Sulfur and accelerators had very little influence on tack even when the stock was precured slightly or scorched.

11:35 A. M.—Basic Reactions during Reclaiming. II. The Effect of Aging of the Scrap, Storage of the Reclaim and the Effect of Solvent Naphtha on Reclaiming of Natural Rubber. *D. S. le Beau (Midwest Rubber Reclaiming Co., East St. Louis, Ill.).*

The effect of aging of the scrap prior to reclaiming is reflected in a greater tendency towards molecular breakdown during reclaiming, particularly during short reclaiming intervals or in the presence of alkali. Longer reclaiming intervals again cause a recombination of the chain fragments originally formed. The characteristic grouping of the data and curves previously obtained for pot heater and digester alkali as well as digester water and metallic chloride reclaims is not disturbed by the aging of the scrap. This again indicates the importance of the surrounding medium during the reclaiming process.

Storage of reclaims over a period of months is discussed. Alkali reclaims were found to be least stable, but regardless of the reclaiming treatment (pot heater or digester) the least stable reclaims were those subjected to short reclaiming periods.

The addition of increasing amounts of solvent naphtha is not reflected in the acetone extract of the reclaim; however, molecular breakdown is considerably increased by it even though the latter is again dominated by the surrounding reclaiming medium. Smaller amounts of solvent naphtha decrease the unsaturation of the reclaims to a sizeable degree, whereas larger amounts show this effect to a lesser degree. However, reclaims prepared with solvent naphtha show at all times a smaller unsaturation than those where solvent naphtha had not been added. Possible causes of these effects are discussed.

Reclaims prepared with solvent naphtha showed greater storage stability than those which had been reclaimed in the absence of solvent naphtha. Infrared analysis of pot heater and digester reclaims did not indicate the formation of oxygen bonds during the reclaiming process.

Throughout the investigation the predominance of the influence of the surrounding reclaiming atmosphere was again recognizable.

These findings, as well as the high rate of molecular breakdown during the initial reclaiming periods and the instability of such reclaims, again point toward the occurrence of hydroperoxidic chain reactions.

Thursday Afternoon—April 22

2:00 P. M.—A Strain Test for Evaluation of Rubber Compounds. ***R. D. Stiehler and F. L. Roth (National Bureau of Standards, Washington, D. C.).***

Measurements of elongation of rubber vulcanizates at a fixed stress have been made with a precision much greater than can be obtained in the usual measurements of stress at a specified elongation. Such measurements form the basis of a strain test developed to characterize rubber vulcanizates in control and research testing. Statistical analyses show that the errors introduced in the actual strain measurements are negligible compared to those introduced by variations during compounding and curing, whereas the errors introduced by the usual measurements of stress at a specified elongation are of the same order of magnitude.

The high precision of strain testing has been used to detect variations within a single sheet of vulcanized rubber and variations among sheets cured from the same compounded batch. It has also been possible to determine with a single sheet its change in stiffness or modulus with age. The uniform treatment of specimens in the strain test makes them particularly useful for precise measurements of set. In addition to the high precision of the strain test, the decrease in elongation with time of cure apparently follows the laws of a second-order reaction which makes it possible to calculate three vulcanization parameters.

2:25 P. M.—A Visco-Elastic Study of Modulus. ***L. T. Eby and D. J. Buckley (Standard Oil Development Co., Elizabeth, N. J.).***

Modulus of rubber vulcanizates has been separated into elastic and viscous components for a study of the effects of compounding and vulcanization variables. A simplified view of the factors contributing to modulus has been taken which is both practical and a good approximation of theoretical concepts. Modulus is determined in the usual manner, and represents the sum of the force required to overcome the viscosity which is present only in a non-equilibrated system and the elastic force which is not dissipated with time. Total modulus and elastic modulus are determined experimentally while viscous modulus is the difference between these values. The magnitude and ratio of elastic and viscous modulus are the determining factors in certain physical properties of a vulcanizate, among these are resilience and retraction rate.

The elastic modulus was found to be directly proportional to temperature as predicted and illustrated by previous workers. The reinforcement obtained by cross-links and the more permanent absorptive effects are measured by the elastic modulus exclusive of stiffening effects due to frictional considerations. The viscous modulus does not vary linearly with temperature but changes in a fashion similar to viscosity effects in oils, i.e., much greater increase at lower temperatures.

The viscous modulus is nearly constant for a particular compound regardless of the state of vulcanization, although there is a slight increase with increased vulcanization. The effect of various ingredients on true reinforcement can be separated from the effects they have on softening or stiffening. The change in physical properties of a vulcanizate with temperature can be predicted from elastic and viscous moduli changes.

2:45 P. M.—The Thermal Conductivity of Rubber Compounds. ***D. R. Elliott, J. W. Marshall, and A. W. Bull (U. S. Rubber Co., New York, N. Y.).***

The thermal conductivity of rubber-like materials is discussed from a general point of view. The authors conclude that it is impractical to increase the thermal conductivity of the polymers themselves. However, the thermal conductivity of rubber compounds may be increased considerably by the use of various fillers. It is found that for compounds containing fillers the following applies:

1. The effective thermal conductivity of rubber compounds is independent of the size of the filler particles.
2. The shape of the filler particles plays an important part.
3. Formulas are presented which enable one to estimate the effective thermal conductivity of a filler in rubber from the shape and thermal conductivity of the particle.
4. Oriented fillers are several times more effective in increasing the thermal conductivity of compounds than channel blacks.
5. A filler poor in electrical conductivity may have a relatively high effective thermal conductivity in rubber.
6. In order to fully evaluate the effective thermal conductivity of an oriented filler, one must, in general, measure the thermal conductivity in three mutually perpendicular directions.
7. The increase in the thermal conductivity resulting from the use of mixtures of different fillers in rubber compounds under suitable conditions is considerably greater than the total increase in the thermal conductivity for the fillers used separately.

The experimental apparatus and methods are described.

3:10 P. M.—The Effect of Specimen Size on the Tensile Strength of Natural Rubber and GR-S. ***T. Higuchi, H. M. Leeper, and D. S. Davis (Government Laboratories, University of Akron, Akron, Ohio).***

Peirce's equation, which relates observed tensile strengths of textile fibers to their lengths, was found to be applicable to rubber-like materials if specimen volume is used in place of specimen length. Experiments in which the tensile strengths of GR-S and natural rubber compositions were determined for a range of specimen sizes yielded results in close accord with theory.

A ten-fold increase in the volume of the material resulted in a decrease of 308-349 and of 167 pounds per square inch in the observed tensile strength of GR-S and comparable natural rubber stocks, respectively. The numerical magnitudes of the slopes of the straight lines obtained when tensile strengths were plotted against the logarithms of the relative specimen volumes are shown to bear a direct relationship to the homogeneity of the stock under test.

The use of a special type of dumbbell sample with a constricted center obviates failure at the shoulders and elsewhere, attributable to heterogeneity, and has made possible the practical application of the method.

Note: This investigation was carried out under the sponsorship of the Reconstruction Finance Corporation, Office of Rubber Reserve, in connection with the Synthetic Rubber Program of the United States Government.

3:30 P. M.—Cellular Ebonites From Nitrile-Type Synthetic Rubbers. ***Richard A. Clark and Laverne E. Cheyney (Battelle Memorial Institute, Columbus, Ohio).***

This paper is a description of some compounding studies directed toward improving the compression properties of cellular ebonites derived from nitrile-type synthetic rubbers. Most of the study was confined to the commercial rubbers known as Chemigum-N3 and Chemigum-N3NS, since this type of rubber was found to give a more complete blow and lower mold shrinkage than other types tested.

Variation of sulfur content in these cellular ebonites produces some variation in compression properties, but not nearly to the extent which has been reported for noncellular ebonites of this general type. Increase in amount of blowing agent beyond that required to produce the desired blow tended to impair the compression properties of the product. Increase in time of mill breakdown tended to improve the compression properties, but a similar effect was obtained by employing selected plasticizers which shorten the breakdown time.

Reinforcing agents such as carbon black and iron oxide were found to have a limited influence on compression properties; hard rubber dust was similar in its effect. The vulcanization reaction is quite exothermic and the improvement in properties imparted by certain pigments is believed to be a result of lowering the exothermic heat of vulcanization.

It is possible to shorten the time of cure by using selected accelerators, but the highly exothermic reaction produces vulcanizates of inferior quality if the vulcanization is carried out too rapidly. In some fast-curing systems it was found desirable to employ a retarder to delay the cure until complete blowing had taken place.

3:50 P. M.—The Effect of Pigments on the Hardness of Natural and Synthetic Rubbers. *R. E. Smith and L. H. Cohan (Witco Chemical Co., New York, N. Y.).*

This paper deals with the possibility of calculating the Shore A hardness of a rubber stock over a loading range from a test at a single loading.

If a loaded elastomer is considered as a uniform elastic matrix containing inelastic particles, its modulus may be calculated from the Guth and Gold equation (1) when the pigment filler has symmetrical particles, and from the Guth equation (2), when the particles are asymmetrical (rod-shaped):

$$(1)\ M = M_o\ (1 + 2.5V + 14.1V^2)$$

$$(2)\ M = M_o\ (1 + 0.67fV + 1.62f^2V^2)$$

M = modulus of a loaded stock,
M_o = modulus of unloaded matrix,
V = ratio of volume of filler to total volume,
f = shape factor = ratio of the length to diameter of the particle.

Since hardness is a compression modulus at a variable indentation, equations (1) and (2) may be applied to Shore hardness provided it is assumed that the force required to cause a given indentation is proportional to the amount of indentation (amount of compression). On the basis of this assumption, equation (3) relating compression modulus (M) with Shore A hardness (S) was derived:

$$(3)\ \log M = 0.02S\text{-}1$$

Combining equations (3) with equations (1) and (2) respectively:

$$(4)\ S = S_o + \frac{\log\ (1 + 2.5V + 14.1V^2)}{0.02}$$

$$(5)\ S = S_o + \frac{\log\ (1 + 0.67fV + 1.62f^2V^2)}{0.02}$$

Hardness values for calcium carbonate and carbon black pigments of widely differing particle size were obtained over a considerable loading range for each pigment. These values agreed surprisingly well with those calculated from the appropriate equation (4) or (5). Hardness at equivalent state of cure thus appears to depend primarily on the volume loading and particle shape of the pigment filler and to be unaffected by particle size, crystalline structure, chemical nature of the particle surface, or chemical composition of the pigment.

4:10 P. M.—Vulcanization at High Pressures. *C. S. Wilkinson, Jr., and S. D. Gehman (Goodyear Tire & Rubber Co., Akron, Ohio).*

A technique was developed for vulcanizing cylinders of rubber one-half inch in diameter up to one inch high at pressures up to 100,000 lbs. per sq. in. using a small laboratory press (8 inch platens). The specially designed mold was made of alloy steel according to general principles from the high pressure work of Bridgeman. It was pre-stressed at 200,000 p.s.i.

The temperature in the mold cavity was carefully calibrated with thermocouples to determine the equivalent length of cure of the test specimens. Cylinders of GR-S tread stock were vulcanized for a range of cures at 1,000, 20,000, 50,000 and 100,000 p.s.i. and also in a regular type of mold for which the pressure was not determined.

Although the volume compression at 100,000 p.s.i. is about 20%, all of this is recovered when the pressure is released. This was ascertained by precise density measurements of the test specimens.

The electrical resistivity of the test pieces increased with higher vulcanizing pressures, from 5×10^{13} ohm-cm. for samples vulcanized at 1,000 p.s.i. to 1099×10^{13} ohm-cm. for those vulcanized at 100,000 p.s.i. This is taken to indicate the existence of a better carbon black dispersion in the samples vulcanized at high pressures. The explanation for this may be the reduction of carbon black flocculation during the cure by the high viscosity of the rubber induced by high pressure. This effect of pressure on viscosity is well known for organic liquids and is large.

The dynamic modulus, internal friction, and resilience of the test specimens were determined with the Goodyear Vibrotester. The effects of high vulcanizing pressures on these properties is pronounced. It consists apparently in an increased rate of cure upon which is superimposed effects due to the variation in the type of carbon black dispersion. The result is, in general, the attainment of a more resilient GR-S tread stock at a reduced vulcanization time.

Friday Morning—April 23

9:00 A. M.—Coagulant Deposition of Latices. Part I. *H. B. Morris and R. F. Hinderer (Eagle Rubber Co., Ashland, Ohio).*

Many products such as balloons, dolls, gloves, automotive parts, coated trays, baskets and wire are dipped from latex. Several patents describe the basic procedures employed. Most processes rely upon the coagulation of latex as brought about by the action of destabilizing chemicals in solvent media. This work was undertaken to determine the effects of operating variables in this type of manufacture. The results are reported to stimulate interest and further work in this field.

It was considered best to divide the work and report into at least two parts; the first dealing only with deposition from natural latex as affected by (a) time of immersion or "dwell," (b) coagulant concentration, (c) latex pH, (d) latex solids, and (e) latex viscosity. The second and later parts will include neoprene latex and other coagulating agents.

Experimental procedure is described in detail and data obtained is interpreted graphically. A bibliography of pertinent literature and patents is included.

9:25 A. M.—High Styrene Resins in Rubber Compounding. *A. G. Susie and W. J. Wald (Marbon Corp., Gary, Ind.).*

The use of high styrene resins in the field of rubber compounding, particularly with synthetic rubber, has been of recent origin. The high styrene copolymer resins, Marbon S and Marbon S-1, were the first commercial products of this class manufactured in this country. Data are given on the properties of these resins and their uses in reinforcing the following elastomers: GR-S, nitrile rubbers (GR-A), polychloroprene (GR-M) and natural rubber, particularly in non-black stocks.

9:45 A. M.—Stability of Accelerators as Affected by High Processing Temperatures. *F. L. Holbrook and T. H. Fitzgerald (U. S. Rubber Co., Naugatuck, Conn.).*

Reports from the rubber industry indicate an increasing trend toward high speed Banbury mixing during which temperatures are generated in the range of 300° F. In view of the widespread practice of adding accelerators during the latter part of the Banbury mix a study has been made to determine the effect of such high processing temperatures on the activity of a representative group of rubber accelerators.

The following general conclusions are indicated by results from duplicate batches containing each acceleration. The batches were identical and both mixed in a laboratory 1 B Banbury operating at 350° F. but to one batch of each pair the accelerator was introduced in the Banbury two minutes before the end of the mix and to the other, the accelerator was added on a relatively cool sheeting mill:

I—All accelerators tested show some impairment in strength due to the high processing temperature.

II—Thiazoles, thiazole derivatives and activated thiazoles show but slight impairment and in general are considered satisfactory for high speed Banbury mixing.

III—Thiurams and dithiocarbamates lose greatly in accelerating value and their use should be confined to relatively low temperature processing.

IV—Aldehyde amines show widely varying degrees of impairment and thus cannot well be classified as a group with respect to suitability for high temperature processing.

10:10 A. M.—A Contribution to the Knowledge of Compounding Rubber With Petroleum Products. I. Correlation of Chemical Characteristics of Higher Boiling Fractions of Petroleum with their Compounding Properties. *Fritz S. Rostler (Golden Bear Oil Co., Oildale, Calif.).*

Present practice in evaluating rubber compounding ingredients which are petroleum fractions is to measure and compare physical properties of rubber compounds containing them. This paper

presents a more direct method of evaluation by chemical analysis of the materials themselves.

It has been found that all petroleum products which originate from higher boiling fractions of crude oil can be defined as consisting of five basic groups of components which can be identified and quantitatively determined by chemical methods of analysis. These five groups of components have been isolated and tested in test compounds of GR-S and natural rubber. Each of these groups of components shows typical behavior in the test compounds, affecting differently both the curing characteristics and the physical properties of a rubber compound.

These tests, as well as tests on a number of petroleum products containing these basic groups of components in various proportions, have revealed the possibility of predicting the performance of the petroleum products without resorting to the present practice of mixing and testing a rubber compound. The test results, presented in tables and graphs, show that the performance of a petroleum product in rubber depends on the type and proportion of the basic components in the compounding ingredients.

The characterization of petroleum products reported in this paper should prove especially useful for identification of rubber compounding ingredients of the groups known as plasticizers, extenders and process oils, which are offered on the market under a multitude of trade names.

10:35 A. M.—A Contribution to the Knowledge of Compounding Rubber With Petroleum Products. II. Method of Quantitative Analysis for Classification and Identification of Petroleum Products Used as Compounding Ingredients in Rubber. ***Fritz S. Rostler (Golden Bear Oil Co., Oildale, Calif.), and Heinz W. Sternberg (Wilmington Chemical Corp., Wilmington, Del.).***

A quantitative method of analysis has been developed which defines high boiling fractions of petroleum as consisting of five groups of components of characteristic reactivity. The preceding paper showed the correlation of the analytical data obtained with the behavior of the petroleum products in rubber compounds. This paper reports in detail the analytical methods employed to determine and identify the characteristic components.

The method of analysis is gravimetric and consists in principle of step-wise precipitation with sulfuric acid. Techniques, apparatus and chemicals used in the analysis are described. Investigations which led to adoption of the test conditions are reported. Examples of analyses are given, as is analytical data collected on a great number of samples of typical compounding ingredients originating from petroleum. Compositions of petroleum products on the market are shown in tabular form. The variation in compositions is considerable even for products sold under the same label.

The method is simple and can easily be handled by laboratory technicians. It lends itself to routine analysis for raw material control. Although originally developed for testing of petroleum products for rubber, the method is generally applicable to all petroleum products and bitumens of high boiling range.

The paper suggests a means to identify and describe petroleum products and other bitumens by chemical characteristics rather than by trade names and functional terms.

10:55 A. M.—A Study of the Effect of a Petroleum Type Plasticizer on Various Furnace Blacks in Natural Rubber. ***R. E. Elliott (Standard Oil Co. of Indiana, Chicago, Ill.) and H. A. Winkelmann (Dryden Rubber Division, Sheller Mfg. Corp., Chicago, Ill.).***

The scarcity of natural gas and the low yields of the channel black process have resulted in intensive developments on furnace type blacks. This work has resulted in the reinforcing types (RF) of furnace blacks, which are now offered as replacements for channel black. The higher pH of the furnace blacks has resulted in faster cures and greater scorching tendency in both GR-S and natural rubber. This study has been undertaken to determine the effectiveness of a petroleum type plasticizer with normal and high black loadings as a processing aid in furnace black-natural rubber compounds.

Data presented brings out the value of such a softener in controlling sulfur bloom in the uncured compounds as well as compounds on the undercured side. Increased amounts of softener have the usual effect on the original physical properties, such as reduction of modulus, tensile, hardness and tear, and increase in elongation. In various of the compounds tested the physical properties on aging are greatly improved by the presence of the plasticizer.

11:15 A. M.—Petroleum Softeners in Natural Rubber and GR-S-Natural Blends. ***E. P. Rittershausen and P. D. Sharpe (Socony-Vacuum Oil Co., New York, N. Y.).***

The results of a softener study are presented, showing the applicability of two distinct types of petroleum products as rubber compounding ingredients. Compounds containing smoked sheets and GR-S as well as a blend of these polymers were investigated in a tire tread formulation. Data are given showing that the petroleum plasticizers impart properties to the vulcanizates which are comparable to those obtained with pine tar.

Physical properties of the two petroleum oils employed in this study are given. Both products, one of which is a blended asphaltic type softener and the other a light bodied aromatic plasticizer, are fluid at room temperature and exhibit good wetting and pigment dispersing properties. Laboratory evaluations of tensile properties, flex life and abrasion loss, and the resistance of these properties to oxygen bomb aging are reported. Williams plasticity and recovery data are also given.

Comparable results for such properties as tensile strength, modulus, elongation, Shore hardness and permanent set are obtained for both pine tar and the petroleum plasticizers. Plasticity data indicate that while pine tar exerts a greater softening action on natural rubber than on GR-S stocks, both petroleum products studied show equivalent softening action on these polymers. In those compounds containing GR-S, generally better abrasion resistance is noted when petroleum softeners are employed, while slightly better abrasion resistance is observed in the pine tar-natural rubber combination. Pine tar imparts significantly better flex resistance to all of the vulcanizates tested.

Report of Injuries in the Rubber Industry

IN A RECENT survey made by the National Safety Council of injuries in the rubber industry, even though the reports were incomplete in many respects, certain general impressions were gained as follows:

1. Plant layout could be improved in many instances. Many injuries resulted when persons working on one machine bumped their heads or legs against other equipment, or had materials fall on them.

2. Housekeeping is in need of improvement. There appeared to be no definite work areas or aisle areas. Materials and equipment were not kept in definite places, and plant vehicles seemed to be free to operate anywhere they could be driven or pushed.

3. Material piling is poor, and in many instances employees failed to use the lifting equipment that was provided.

4. There is lack of teamwork in doing jobs requiring two or more men.

5. Machinery is improperly guarded. It may be possible that guards are not feasible in all cases, but there definitely were many instances in which guards could be used. The operating area of presses can be guarded; starting pedals can be protected; driving mechanisms can be covered.

6. Many injuries resulted from the use of defective equipment.

7. Bars are used for a variety of purposes in handling rubber, tires, etc. Employees handle the bars with reasonable safety, but when these bars are not in use, they are not put in a safe place.

8. Safety shoe, gloves, and goggles are frequently not used. Because of the great amount of manual handling of heavy objects, use of safety shoes should be mandatory, and goggles and gloves could be used more often.

Editorials . . . . . .

Rubber Legislation

THIS editorial will concern itself with pending permanent legislation on rubber. It is a particularly difficult editorial to write, because by the time this issue is published and reaches the reader the chances are strong that such legislation will have passed both houses of Congress and will have become fact. At the moment we cannot deal with fact, other than to discuss the progress made by proposed legislation to date (March 10) and review the immediate situation.

As reported in detail elsewhere in this issue, the House of Representatives has already passed the revised Shafer Bill. The bill introduced in the Senate by Senator Bricker and his colleagues on the subcommittee of the Banking and Currency Committee has been reported back to the latter committee but at this writing has not been reported out by the full committee. The subcommittee, however, has held public hearings and has already received the views and opinions of both the industry and the government. Passage of the Bricker bill, in either its present or modified form, by the Senate is assured, and it is probable that the House and Senate subcommittees will then get together and whip up a bill which will easily clear both houses.

Seldom has the rubber industry banded together as strongly as it did to voice concerted objection to the terms of the original "Rubber Act of 1948" initially introduced by Representative Shafer on February 6. Hasty meetings were called of various industry advisory groups and long statements issued listing the numerous objections to the measure. Individual statements condemning the bill were publicized by several executives. A meeting with Mr. Shafer and his subcommittee was requested and obtained. All of the objections were later voiced at the public hearings held on the Bricker Bill.

An indication of how strongly the industry objected to the original House measure can be determined from a letter sent by Herbert E. Smith, president of the U. S. Rubber Co., to Mr. Shafer shortly after its introduction. Mr. Smith pointed out that the lack of a termination date in the bill represented an attempt "to perpetuate government control over the rubber industry, our company, and the American consumer." He charged that it "perpetually controls and regulates rubber production and manufacture," and, as written, "obstructs progressive improvement in quality and reduction in cost under our American system of free, competitive enterprise."

Mr. Smith's letter went further. It stated that for the first time in the country's history "the American consumer faces a situation where a given product is forced down his throat . . . and it may be forced down at a high price, for the bill fails to provide a pricing policy." Another major objection voiced was that the initial bill "authorizes the President to exercise allocation, specification and inventory controls . . . notwithstanding any change in the supply or estimated supplies."

The net result of the industry's firm stand against the first Shafer Bill was a modification of some of its points by the full House Armed Services Committee. The major victory won by the industry was the inclusion of a termination date—June 30, 1950—in the revised measure. Some of the other terms of the bill were also modified, but in most respects the bill was approved by the House as originally written.

Whereas the Shafer bill ran into violent objection from the industry, the Bricker bill received its full approval. Although a few minor amendments were suggested by the Munitions Board Rubber Industry Advisory Committee, on the whole the bill received the blessings of the field. Harvey Firestone, Jr., said "it meets in a practical manner the problems with which we are confronted." William O'Neil commented that "this is the first time I've ever found the rubber industry together." J. P. Seiberling stated it "properly safeguarded American business against the ravages of socialism, planned economy and prolonged government regimentation." William Welch gave complete approval to the "philosophy" of the bill. Everett Morss predicted it would lead "to the development of a better polymer than GR-S."

The terms of the bill leading to this high praise will also be found in detail elsewhere in this issue. By this time they may be law.

CURRENT NEWS OF THE MONTH

PERMANENT RUBBER LEGISLATION IN OFFING AS HOUSE PASSES REVISED SHAFER BILL

PERMANENT rubber legislation to replace present controls which expire at the end of this month was definitely in the offing at this writing (March 9). Bills have been introduced to both the House and Senate, public hearings have been held, a compromise bill completely acceptable to the rubber manufacturing industry is being prepared and is assured of passage, and the new legislation will probably be effective by the time this issue is published. Chronologically, the following has transpired since our last report: A revised Shafer bill (H.R. 5314) was introduced to the House on February 6, the Bricker Bill (S-2187) was introduced to the Senate on February 20, public hearings on both bills were held on February 24 and March 2, the House passed the revised Shafer bill on March 5. A vote on the Bricker bill in the Senate is expected within the next several days.

The Shafer bill passed by a voice vote in the House on March 5 contained most of the provisions included in the original bill first introduced by Representative Paul W. Shafer (R., Michigan.) on January 19, as reported in detail in our previous issue. The major change in the bill was the inclusion of a termination date for taking the government out of the synthetic rubber industry. Whereas the original measure continued government controls for five years, the approved bill continues control through June 30, 1950, only.

Briefly, the approved Shafer bill calls for mandatory consumption of 200,000 tons of general purpose and 25,000 tons of special purpose synthetic rubber annually, operating or standby facilities for the production of 600,000 tons of general purpose and 75,000 tons of special purpose synthetic annually, authorization for the president to negotiate modification of the existing patent pool, authorization for import restrictions on rubber products, and approval of Congress after recommendation from the National Security Resources Board on the sale of any synthetic rubber production facilities.

Initial Bricker Bill

The Senate bill (S-2187) introduced by Senator Bricker (R., Ohio) on February 20 for himself and Senators Cain (R., Wash.) and Robertson (D., West Va.) was referred back to the Committee on Banking and Currency and became the subject of public hearings. Unlike the original Shafer measure but like the approved Shafer bill, it included a termination date of June 30, 1950.

In most respects the Bricker bill coincided with the Shafer bill passed by the House. It calls for maintenance of production capacity of not less than 600,000 long tons of general purpose synthetic annually, but only 65,000 tons of special purpose synthetic rather than the 75,000 tons covered in the Shafer bill. However, where the Shafer bill calls for the mandatory use of not less than 225,000 tons of synthetic rubber annually, the Bricker bill merely provides for controls to be issued to insure (a) the consumption of specified percentages of general purpose synthetic in transportation items such as tires, camelback and flaps, and (b) the consumption of specified percentages of any or all types of special purpose synthetic rubber in inner tubes.

The Bricker bill also specifies that any agency designated by the President to handle rubber controls shall undertake an immediate study in order to formulate a program for disposal to private industry by sale or lease of the government-owned rubber producing facilities, and further that a report with respect to the development of such a disposal program shall be made to the President and to Congress not later than April 1, 1949. The same agency is given authority to sell, lease or otherwise dispose to private persons any rubber producing facilities not required to fill the capacity designated in the bill (as reported above).

With regard to the existing patent pool arrangement, originally signed on December 19, 1941, and supplemented June 12, 1942, the Bricker bill is somewhat more definite than the Shafer measure. Under the Bricker bill the President is "authorized and directed" insofar as practical to "effectuate immediate cessation of further accumulation of technical information or rights to patents" under the agreement. The Shafer bill is more moderate in this respect.

Viewpoint of the Industry

Whereas publication of the terms of the original Shafer measure brought forth a storm of criticism from the industry, little objection was raised to the Bricker bill. The major objections to the first Shafer measure were that without a termination date it created a socialistic and bureaucratic form of complete control over the industry, that it lacked statements of policy, that the authority given to the President was too broad, that disposal provisions of synthetic rubber producing facilities were too complicated, and that the provisions on patent pooling failed of clear interpretation. Some of these objections were eliminated in the bill finally approved in the House on March 5.

Strong support for the Bricker bill was voiced at the first of the public hearings held by the subcommittee of the Senate Banking and Currency Committee, headed by Senator Bricker, in Washington on February 24. The industry's position, drawn up by the Munitions Board Rubber Industry Advisory Committee, was presented by A. L. Viles, president of the Rubber Manufacturers Association. Mr. Viles said the industry "unanimously indorsed" the Bricker bill with four suggested changes, as follows:

Specific Amendments Suggested

(1) Require the Administration to report a disposal program for the government-owned synthetic rubber facilities by January 1, 1949, rather than by April 1, 1949, as now specified.

(2) Terminate the government's role in synthetic rubber on June 30, 1949, rather than June 30, 1950. (According to testimony by George M. Tisdale, vice-president of the U. S. Rubber Co., the government's stockpile of natural rubber should be accumulated by mid-1949).

(3) Restrict government authority to impose specification controls to tires, camelback and flaps.

(4) Make certain that any of the 600,000 tons of GR-S capacity held by the government until June, 1949, is used for synthetic rubber if leased to private interests before that date.

Among those offering testimony at the February 24th hearing and voicing approval of the Bricker measure, in addition to Mr. Viles, were Harvey Firestone, Jr., chairman, Firestone Tire & Rubber Co.; William O'Neill, president, General Tire & Rubber Co.; J. P. Seiberling, president, Seiberling Rubber Co.; William Welch, president, Midwest Rubber Reclaiming Co.; Everett Morss, president, Simplex Wire & Cable Co.; and Robert S. Wilson, vice-president, Goodyear Tire & Rubber Co.

The sole dissent came from Robert A. Winters of the Rubber Heel and Sole Manufacturers Association. He opened disposal of synthetic rubber facilities to those now in the rubber business and asked for Government "price incentive" by keeping the cost of synthetic rubber to 20 cents a pound through subsidies to consumers.

Administration Officials Differ

Opinions of various Administration officials representing five separate government agencies concerned with rubber were voiced at the concluded hearings held on March 2. On only one major point did officials of all agencies agree, namely, that the Bricker bill should be revised to authorize specification, allocation and inventory controls over both natural and synthetic rubber and to permit control of rubber products other than transportation items alone.

The Administration's viewpoint was detailed in a memorandum from Presidential Assistant John R. Steelman. Although split on the question of writing a termination date to government authority over the rubber industry, the five agencies involved accepted the termination date of June 30, 1950, contained in the Bricker bill. They appeared satisfied that the bill's provision for a review early next year leaves the way open for a possible extension of controls if synthetic rubber is not on a firm competitive footing by that time.

The Munitions Board, Commerce Department and National Security Resources Board went on record as prefering no termination date, because of the uncertain political situation in the Far East. These three agencies, however, said they would accept the termination date of June 30, 1950, as favored by the State Department and the Reconstruction Finance Corporation.

According to the viewpoint expressed in the memorandum, although the Bricker bill favors turning over synthetic rubber facilities to private industry, the provisions of the bill make such action almost impossible. It was proposed that the government be permitted to lease or sell any synthetic rubber facilities as soon as new legislation is effective on April 1.

With respect to patent pooling, it was suggested that other Administrative agencies be given authority to force the Reconstruction Finance Corporation to submit to industry demands that any company pioneering a new technical development can retain such development for its own use and not be required to share it with RFC and other rubber manufacturers.

Finally, with White House support, the five government agencies recommended that Congress require production and consumption of at least 200,000 long tons of GR-S annually, as provided in the Shafer bill.

Rez-N-Glue" Vinyl Base Cement

The Schwartz Chemical Co., Inc., 326 West 70 St., New York 23, N. Y., has developed a vinyl base cement with which rubber, plastics, metal, leather, glass and crockery can be adhered to themselves or to each other. Named "Rez-n-glue," the product is an all-purpose transparent water-white cement that does not affect the material it is applied to, the company stated. It can be applied by brush, roller or spray and is resistant to water, oil, gasoline, vermin and mould. The cement is said to be non-staining and to have excellent tensile strength.

P-114-RM Isopol Resin

P-114-RM Isopol Resin, an "upside down" copolymer consisting of 75% styrene and 25% isoprene, has been developed by the Union Bay State Chemical Co., Cambridge, Mass. The new product is clear, hard, and nearly water-white in appearance, and possesses many of the chemical properties of rubber. It is unique in that it is completely soluble in petroleum naphtha, a property achieved by almost complete elimination of cross linking. The new resin is expected to find application as a compounding ingredient for both natural and synthetic rubber stocks, since it lowers plasticity to improve processing and aids extrusion and molding. Preliminary tests are said to indicate that it acts as a reinforcing and stiffening agent in rubber stocks with which it ultimately vulcanizes intimately. It is also said to be an excellent base for both alkali-resistant and acid-resistant paints.

Changes Corporate Name

The National Rosin Oil and Size Co. has announced a change in corporate name to National Rosin Oil Products, Inc. Main office of the company is located in the R. K. O. Building, Rockefeller Center, New York 20, N. Y. A Western Sales Office and warehouse is maintained at Chicago, Ill. The company refinery is located at Savannah, Ga. Personnel of the company remains unchanged.

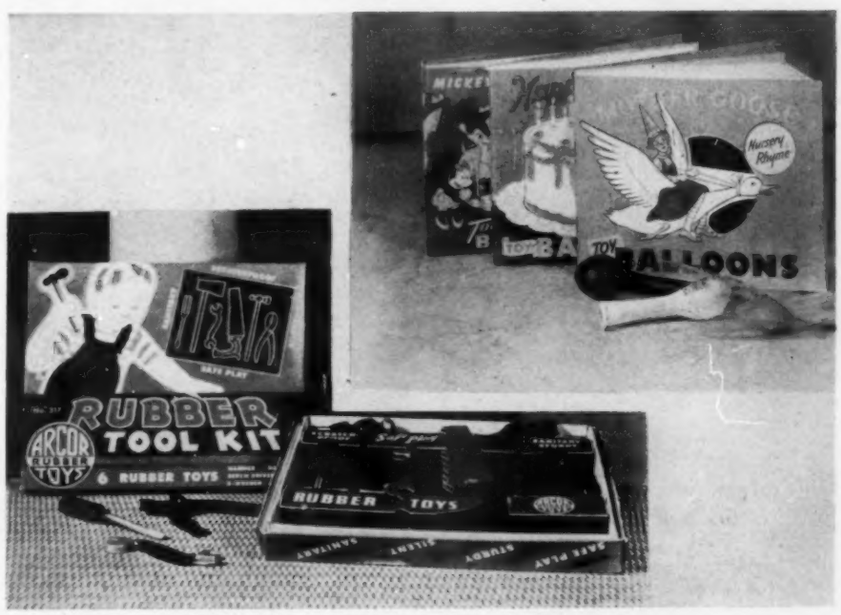
Consolidate Williams Concerns

To serve the trade more effectively, C. K. Williams and Co. and eight of its subsidiaries were consolidated on March 1. The constituent companies, under the new corporate name of C. K. Williams & Co., are the Geo. S. Mepham Corp., Point Milling & Manufacturing Co., Blue Ridge Oxide Co., Calcium Chemical Corp., Seminole Pigment Co., Sulphiro Co., Inc., Synthetic Iron Color Co., C. K. Williams & Co. of California, Ltd., and C. K. Williams and Co. Officers of the new corporation include M. R. Williams, chairman of the board and treasurer; L. K. Ayers, president; J. W. Ayers, R. W. Dodson, Verne Frazee, J. W. Schlosser and T. K. Stinson, vice-presidents; and E. G. Davies, secretary. Executive offices of the firm will be located at East St. Louis, Ill., and branch offices will remain at the several plant locations. C. K. Williams and Co. was organized in 1878.

Organize Canadian Branch

Organization of a Canadian company allied with the Meflex Products Co., Inc., of Akron, Ohio, was recently announced. The firm, Meflex Products (Canada) Ltd., was incorporated in Ontario and will have its offices in Fort William, Ontario. Officers of the company are L. E. Warford, president; Fred Page, vice-president and manager; and Mrs. L. E. Warford, secretary.

RUBBER CONCERNS AMONG WINNERS IN 5-AND-10 PACKAGING CONTEST



Products of several rubber manufacturing concerns were among those to which awards were given in the 1947 Five-and-Ten Packaging Contest. Sponsored annually by the *Syndicate Store Merchandiser,* business magazine of the variety trade, the contest is confined to popular-priced merchandise ranging from 5c to $1.00 sold in the nation's "five-and-tens."

Two of the winners are depicted above. The "Book O' Balloons," manufactured by the Oak Rubber Co., adapts the "album" idea to toy balloons, and was the winner of the award in the stationery games and toys division. The "Arcor Rubber Tool Kit," a product of the Auburn Rubber Corp., which won honorable mention in the same division, is put up in a folding box of separating construction which is fitted with a special, die-cut platform for display of the complete six-tool set of rubber toys.

OMD RESUMES ITS CONTROL OVER DISTRIBUTION OF GR-S

Resumption of control over the distribution of GR-S by the Office of Materials Distribution of the Department of Commerce was announced on February 13. This control was dropped by OMD last July since which time the Office of Rubber Reserve has distributed GR-S by controlled sales. Resumption of control is in line with recommendations made by the Rubber Industry Advisory Committee.

Earl Glen, Chief of OMD's Rubber Division, said the authority for allocation and other controls over natural and synthetic rubber rests by statute with the Department of Commerce and that it was obligatory on the Department to resume direction of distribution in view of shortages of GR-S synthetic rubber which have existed since November.

When OMD dropped its allocation controls last year, Mr. Glen said, the rubber industry was expecting a lessening of demand which, however, did not materialize. The allocation procedure provided for in the new amendment of Rubber Order R-1 does not call for any change in the Office of Rubber Reserve's purchase procedure or "firm commitment" plan and will not require original application to OMD for authority to purchase.

The fourth quarter of 1947 will be used as the base period for determining allocations to manufacturers. About 73,000 tons of GR-S will be earmarked for distribution during the first quarter of this year to manufacturers of transportation items, principally tires, in which specified percentages of synthetic rubber must be used. Quantities to be allcoated, Mr. Glen said, wil be sufficient for manufacture during the quarter of up to the same number of transportation items as were turned out in the base period provided the manufacturers demonstrated use calls for them. No allocation will permit an inventory of finished goods in excess of 20 days' supply.

A balance of about 20,000 tons of GR-S expected to be available for distribution during the quarter after the set-aside for transportation items will be allocated for other products. This rubber will be distributed among manufacturers who need GR-S because of technical difficulties in using natural rubber and those who prefer to use the synthetic. Both of these groups are "voluntary" users of synthetic rubber since no set specifications apply to their products.

Each manufacturer of non-transportation products who established a hardship case resulting from technical difficulties in the use of materials other than GR-S will be granted sufficient synthetic to produce substantially the same quantity of such products as he turned out during the base period. A final distribution of any GR-S remaining unallocated then will be made to all manufacturers of non-transportation items who prefer to use the synthetic. This distribution will be based on the ratio which the percentage of each manufacturer's voluntary consumption in the base period bears to the total voluntary consumption for that time.

Coming Events

Mar. 26. Chicago Rubber Group.

Apr. 2. New York Rubber Group, Henry Hudson Hotel, New York.

Apr. 8. Quebec Rubber Group, Ritz-Carlton Hotel, Montreal.

Apr. 16. Akron Rubber Group.

Apr. 21-23. Rubber Division, A.C.S., Spring Meeting, Hotel Sherman, Chicago.

May 7. Chicago Rubber Group.

May 13. Quebec Rubber Group, Ritz-Carlton Hotel, Montreal.

May 14. Connecticut Rubber Group.

May 21. Detroit Rubber & Plastics Group, Detroit-Leland Hotel, Detroit, Mich.

June 5. Southern Ohio Rubber Group, Outing.

June 8. Rubber Division, C.I.C., Windsor Hotel, Mount Royal Hotel, Montreal, Canada.

June 18. Akron Rubber Group, Outing.

June 21-25. A.S.T.M., Annual Meeting, Book-Cadillac Hotel, Detroit.

June 23-25. Second Rubber Technology Conference, London, England. (Auspices of Institution of the Rubber Industry.)

June 25. Detroit Rubber & Plastics Group, Outing, Forest Lake Country Club, Detroit, Mich.

July 17. Chicago Rubber Group, Golf Outing, Acacia Country Club, Chicago, Ill.

July 22-23. Rubber Division, A.C.S., Regional Meeting, Hotel Mayfair, Los Angeles, Calif.

Sept. 10. Detroit Rubber & Plastics Group, Detroit-Leland Hotel, Detroit, Mich. (Tentative).

Sept. 17. Southern Ohio Rubber Group, Dayton, Ohio. (Tentative).

Sept. 24. Boston Rubber Group, Somerset Hotel, Boston.

Oct. 15. New York Rubber Group, New York, N. Y.

Nov. 8-10. Rubber Division, A.C.S., Fall Meeting, Book-Cadillac Hotel, Detroit, Mich.

Dec. 9. Southern Ohio Rubber Group, Xmas Party, Miami Valley Country Club, Dayton, Ohio.

Dec. 10. New York Rubber Group, Xmas Party, New York, N. Y.

Dec. 10. Detroit Rubber & Plastics Group, Xmas Party, Detroit-Leland Hotel, Detroit, Mich.

Dec. 17. Boston Rubber Group, Somerset Hotel, Boston.

Other minor changes effected by amendment of Rubber Order R-1 change passenger tire and tube size references to correspond with new tire designations, and increase from 50% to 66⅔% the amount of natural rubber latex by weight in latex foam seat cushion topper pads of 2½-inch average thickness or less.

HEEL AND SOLE MANUFACTURERS ORDERED TO HALT PRICE FIXING

Two trade associations and twenty-five manufacturers of rubber heels, soles and accessory products were ordered by the Federal Trade Commission on February 14 to cease and desist from a nation-wide combination and conspiracy to fix and maintain prices for their products.

The order was directed against the Rubber Manufacturers Association, together with George Flint as chairman and twelve manufacturer-members of its Heel and Sole Division; the Rubber Heel and Sole Manufacturers Association and sixteen of its members, and the Cat's Paw Rubber Co., Inc. Four of the twenty-nine manufacturing companies involved are members of both trade associations.

Under the order the respondents are prohibited "from engaging in or carrying out any combination, conspiracy or planned common course of action to establish, fix or maintain prices, terms or conditions of sale, or to adhere to any prices, terms or conditions of sale so fixed or maintained. They are also forbidden to collusively exchange, directly or through any central agency, publication or other medium, price information showing current or future prices or conditions of sale of any respondent manufacturer."

The order is based on findings that the respondent manufacturers, through the two associations and otherwise, in violation of the Federal Trade Commission Act, have "engaged in a combination to suppress and eliminate price and other competition among themselves and among the jobbers of their products, each adopting and utilizing one or more of the following practices: (1) agreements on prices and terms and conditions of sale; (2) agreements on standards of quality to which such price agreements should be applied; and (3) agreements between the manufacturers and their jobber customers on the resale prices to be charged by the jobbers."

The companies named in the order, in addition to the Cat's Paw Rubber Co., were as follows: Avon Sole Co., Alfred Hale Rubber Co., Holtite Manufacturing Co., Panther-Panco Rubber Co., Auburn Rubber Corp., Dryden Rubber Co., Essex Rubber Co., Goodyear Tire & Rubber Co., Seiberling Rubber Co., I.T.S. Co., U. S. Rubber Co., B. F. Goodrich Co., Bearfoot Sole Co.

Also, Bradstone Rubber Co., Hagerstown Rubber Co., Hanover Rubber Co., Lynch Heel Co., Monarch Rubber Co. (Baltimore), Norwalk Tire & Rubber Co., Plymouth Rubber Co., Quabaug Rubber Co., Travelite Rubber Co., Victor Products Corp., Webster Rubber Co.

New Dewey & Almy Plant

The Dewey and Almy Chemical Co., of Cambridge, Mass., has acquired a new plant at Lockport, N. Y., for the manufacture of its Cry-O-Vac specialties, many of which are used in the packaging of frozen and refrigerated foods. The plant is expected to employ about 100 when completely renovated and prepared for operation.

A COLUMBIAN COLOR

STATEX CARBONS · 93 · G K M

THE PROCESS: Protected from injurious oxidation through precise control of atmosphere at all times.

THE PRODUCT: Chemically clean surface. Free from acidity.

THE RESULT: Superior aging and flexing. Economy in Accelerator.

COLUMBIAN CARBON COMPANY

500 TONS OF SMOKE A DAY

COLUMBIAN CARBON CO. MANUFACTURER

BINNEY & SMITH CO. DISTRIBUTOR

MPC (Medium Processing Channel)

STANDARD MICRONEX

◆

EPC (Easy Processing Channel)

MICRONEX W-6

◆

HMF (High Modulus Furnace)

STATEX-93

◆

FF (Fine Furnace)

STATEX-B

◆

VFF (Very Fine Furnace)

STATEX-K

◆

FEF (Fast Extruding Furnace)

STATEX-M

◆

SRF (Semi-Reinforcing Furnace)

FURNEX

◆

COLUMBIAN CARBON CO. — MANUFACTURER

BINNEY & SMITH CO. — DISTRIBUTOR

PLIOTHERM RADIANT HEATING IS DEVELOPED BY GOODYEAR

Homes of the future may be heated as simply as turning on a light switch by use of a new type of rubber compounded to replace rubber's conventional insulating qualities in reverse, according to the Goodyear Tire & Rubber Co. In development by the company's Chemical Products Division under the name of Pliotherm, the material actually builds up heat energy within itself, upon application of electrical power.

Test installations have already been made successfully, according to H. R. Thies, manager of Goodyear's Plastics and Coatings Department, in a number of homes as supplements to regular heating systems, and in small workshops and farm buildings where no other heat was furnished. Developments have shown, he said, that the complete heating of homes, particularly in mild climates, may be accomplished through Pliotherm paneling, built into the structures or as independent wall covering.

In more severe climates, Mr. Thies said, Pliotherm is suited for supplementary heating of recreation rooms, garages, bathrooms, laundries, nurseries and the like. It has also possibilities in milk houses, where constant temperatures are required, other farm buildings, and small workshops where initial costs of heating installations are of prime importance, summer cottages, and in bus, airplane, or railway cars where heating is an adjunct to air-conditioning systems.

The Pliotherm unit, covered with any of the wide range of colors possible in rubber and plastic compounding lends itself to decorative and functional designs. It can be easily combined with wall board, wood panels, rubber and plastic wall coverings, moldings and the like.

The resistivity of Pliotherm (1 to 2 ohms-cm) permits heating elements of practical size to operate on commercial voltages. Designs have been installed, Mr. Thies said, for 24 to 28 volts (aircraft and commercial vehicle power units), 32 volts (farm and railroad cars), 115 volts (domestic), and 220 volts (industrial).

Discussing its construction, Mr. Thies said a sheet of Pliotherm becomes a heating element simply by attaching suitable electrical connections to it and completely enclosing the sheet with conventional insulating rubber. By vulcanizing the rubber cord into the heater proper, firm mechanical anchorage is provided, as well as a waterproof seal.

Announces Shift in Personnel

Several shifts in personnel were recently announced by the American Hard Rubber Co. H. D. King, chief industrial engineer of the Akron plant, has been transferred to New York to fill the newly-created post of product development engineer. Robert S. Wade, associated with the company for the past 10 years, has been appointed supervisor of product engineering at the Akron plant, while Walter M. Smith has been promoted to supervisor of manufacturing at that plant.

Oakleaf Heads Philblack Sales

Amos W. Oakleaf

Amos W. Oakleaf, formerly manager of the Philblack district sales office at Akron, Ohio, has been made general manager of Philblack sales in the United States and Canada. In his new capacity, Mr. Oakleaf will supervise domestic and Canadian sales of Philblack A, Phillips Petroleum Company's high modulus furnace black, and Philblack O, Phillips' new high abrasion furnace black. Mr. Oakleaf is a graduate of the University of Kansas with an A.B. degree in chemistry. After graduating in 1926, he worked for the B. F. Goodrich Co. and subsequently for the U. S. Rubber Co., Toledo Industrial Rubber Co., and the Continental Carbon Co. before joining Phillips Petroleum in March, 1944. He is a member of the Akron, Chicago, Detroit and New York Rubber Groups of the American Chemical Society, and of the Akron City Club.

Hydrocarbons Book Published

Accurate selected values of the fundamental physical constants and properties of a large number of hydrocarbons have been compiled and published by the National Bureau of Standards as Circular C461. This 496-page bound volume, "Selected Values of Properties of Hydrocarbons," is a complete collection of all numerical tables issued by the American Petroleum Institute Research Project 44 as of May 31, 1947. In addition to fundamental constants, conversion factors, useful equations, and molecular weights, the tables include data on boiling point, pressure coefficient of the boiling point, freezing point, specific gravity, refractive index, molecular volume, molecular and specific refraction, specific dispersion, refractivity intercept, viscosity, vapor pressures, equilibrium constant of formation, thermodynamic properties, cryoscopic constants, and heat of fusion. NBS Circular C461 may be obtained from the Superintendent of Documents, Washington 25, D.C., at a cost of $2.75 per copy.

Who makes it? The 1947 RUBBER RED BOOK has the answers. Price: $5.00.

BAKELITE EXPANSION PROGRAM DUE FOR COMPLETION IN 1948

The most extensive program for the expansion of plastics manufacturing facilities in the 37-year history of the Bakelite Corporation, is now in progress and is scheduled for completion during 1948. Facilities for production of all plastics and resins marketed by the Corporation will be increased by 50 to 60 per cent. On individual products, increases will range from 30 to 400 per cent.

The program includes construction of three new plants and expansion at three of the corporation's existing plastics-producing plants. A new works at Ottawa, Illinois, for the processing of Vinylite resins into plastic film, sheeting and rigid sheets, has been built, and is expected to be in production by spring. Production of vinyl resins at the South Charleston, West Virginia, plant has been substantialy increased and the new Texas City, Texas, plant, which also produces Vinylite resins, will be in operation soon.

The greatly increased output of Bakelite polyethylene resins at the South Charleston, West Virginia, plant and the correspondingly increased use for this new plastic resulted in substantial price reductions in June and November of last year.

A program of expansion is also in progress at the Bound Brook, New Jersey, plant. By June of this year this plant will be ready to produce Bakelite Styrene plastics at the rate of 25 million pounds annually. All production of polystyrene at the Bloomfield, New Jersey, plant is being transferred to Bound Book.

By May, facilities at Bound Brook for the manufacture of Bakelite phenolic molding materials alone will be increased by approximately 30 per cent, and enlargement and modernization of the Development Laboratories at Bound Brook will be completed early next year.

A new plant at Monterey, N. L., Mexico, recently began operation for the production of Bakelite general-purpose phenolic molding materials. The plant will also act as Mexican sales agent for all of Bakelite Corporation's products.

Another new plant is being constructed in Canada, near Belleville, Ontario. This plant of Bakelite Company (Canada) Ltd., is expected to be completed the latter part of 1948. Bakelite phenolic plastics and resins and urea resin glues, which are now made at the Toronto plant, will be produced there.

Form Chemical Sales Department

The formation of a department to handle the sales of new chemical products has been announced by the B. F. Goodrich Chemical Co., Cleveland, Ohio. Many of the products assigned to the new sales group will be manufactured in the recently announced $3,000,000 chemical plant now being built at Avon Lake, Ohio. Sam L. Brous, formerly manager of sales development, has been named head of the new Chemical Sales Department. Mr. Brous has been associated with the Goodrich organization since 1929.

PROGRAM OUTLINED FOR RUBBER TECHNOLOGY CONFERENCE IN LONDON

The Institution of the Rubber Industry has announced a tentative program for the Rubber Technology Conference to be held in London on June 23, 24 and 25. The following is a list of the Principal Officers who have, so far, accepted invitations:

Patron, The Rt. Hon. Sir John Anderson; *Honorary President,* Sir Robert Robinson; *President,* F. D. Ascoli; *Honorary Vice-Presidents,* Lord Mc.Gowan (I.C.I.); Sir George Beharrell (Dunlop Rubber); Sir Harry Lindsay (Imperial Institute); H. W. Franklin (I.R.I.); P. J. Burgess (London Advisory Committee for Rubber Research, Ceylon and Malaya). The Chairman of the Rubber Trade Association of London and the President of the Research Association of British Rubber Manufacturers will also act as honorary vice-presidents.

As of January 31, the following papers were being considered for presentation by the Papers Committee of the Conference:

Natural and Synthetic Rubber Latices

Mechanism of the Creaming of Latex, by W. S. Davey and K. C. Sekar (R.R.I.).

White and Yellow Fraction of Hevea Latex, by G. J. van der Bie (R.R.I.).

Studies in the Coagulation of Preserved Latex, by E. A. Murphy, E. W. Madge and D. W. Pounder (Dunlop Rubber).

The Swelling Capacity of Latex Films in Water, by O. Bachle (Farbenfabriken Bayer).

The Control of the Stability of Latex Compounds, by C. F. Flint (I.C.I.).

Coagulants on Rubber Estates in Wartime, submitted by the Proefstation, West Java.

The London Advisory Committee for Rubber Research will also submit a paper within this general grouping.

Chemistry of Rubber

The Nature of the Sulfur Linkages in Rubber Sulfur Vulcanizates, by G. F. Bloomfield (B.R.P.R.A.).

The Hydrochlorination of Natural Rubber, by G. J. van Veerson (Rubber Stichting).

The Determination of the Molecular Weights of High Polymers by Measurements of Osmotic Pressure, by H. W. Melville (Aberdeen University).

Some Observations on the Oxidation of Rubber in Light (I.C.I.).

Physics of Rubber

The Refractive Index of Rubber at Different Wave Lengths, by L. A. Wood and L. W. Tilton (Bureau of Standards).

The Morphology of Elastomers, by E. A. Hauser (M.I.T.).

The Application of Elasticity Theory to Rubber Engineering, by R. S. Rivlin (B.R.P.R.A.).

Permanent Set of Vulcanized Rubber, by L. Mullins (R.A.B.R.M.).

E. Guth of Notre Dame University and J. M. Goppel of the Rubber Stichting will also submit papers within this general grouping.

Testing and Analysis

The Direct Determination of Oxygen in Rubbers, by W. T. Chambers (B.R.P.R.A.).

The Kinetic Analysis of Rubber Halides, by G. Salomon (Rubber Stichting).

Meaning of Test Results, by R. G. Newton (R.A.B.R.M.).

Interpretation of Plasticity Measurements, by J. R. Scott and R. W. Whorlow (R.A.B.R.M.).

B.B.S.T. Boonstea of the Rubber Stichting, J. Le Bras of L'Institute Francais and L. J. Bellamy and J. H. Lawrie of the British Ministry of Supply will also submit papers within this general grouping.

Synthetic Rubber

Comparison of Natural and Butadiene-Styrene Rubbers, by R. P. Dinsmore and J. H. Fielding (Goodyear).

The Low Temperature Performance of Butyl Inner Tubes, by R. J. Adams, E. J. Buckler and G. C. Wanless (Polymer Corp.).

The Development of Synthetic Rubber in Germany, by E. Konrad (Farbenfabriken Bayer).

S. L. Bass, of the Dow Corning Corp., will submit a paper on Silicone Rubber, while papers are also planned by the Standard Oil Co. and E. I. du Pont de Nemours & Co. in this classification.

Compounding Ingredients

Two papers are planned thus far in this category, one on "Sponge Blowing Agents" by a representative of Imperial Chemical Industries, and the other by E. Guth of the University of Notre Dame.

Fibres and Textiles

Three papers are included in this section so far, one of "Test and Use of Synthetic Textiles in the Manufacture of Tires" by O. Bachle and G. Fromandi of Farbenfabriken Bayer, and the others by representatives of British Nylon Spinners, Ltd., and British Celanese, Ltd.

Factory Process and Products

Limiting Factors in the Mathematical Design for Rubber Suspension Units, by H. L. Jenkins, D. H. D. Cooper and W. A. Gurney (Dunlop Rubber).

Factors Affecting Power Consumption in Tires, R. D. Evans, (Goodyear).

Rubber to Metal Bonding, by S. Buchan (Andre Rubber, Ltd.).

Plan Annual A.S.T.M. Meeting

Plans are progressing for the 1948 annual meeting of the American Society for Testing Materials, the fifty-first to be observed, which will be held in Detroit the week beginning June 21. The Edgar Marburg Lecture will be delivered by Dr. Paul Aebersold, chief of the isotopes division of the Atomic Energy Commission. A number of symposiums will also be held, including one on "Creep, Stress Rupture and Short-Time High-Temperature Tension Testing." The usual equipment display will be another feature.

Industry Party Honors Abramson

S. E. "Ed" Abramson

S. E. "Ed" Abramson, a pioneer in the mechanical rubber goods field who recently retired from the Motor Products Division of the U.S. Rubber Co. after more than 50 years of service in the rubber field, was tendered an industry party at the Bonnie Brook Golf Club in Detroit, Mich., on March 11. The testimonial party was sponsored by a group of rubber and automotive individuals, many of whom have been in competition with Mr. Abramson for years. A specially engraved wrist watch was presented to Mr. Abramson at the dinner and a travelling clock to Mrs. Abramson.

"Ed" Abramson began his career in San Francisco, Calif., with the Revere Rubber Co. in May, 1897, as a stock clerk. Revere Rubber later was absorbed by U.S. Rubber and became the foundation of that company's mechanical goods division. He was transferred to the Chicago branch in 1900, returned to San Francisco in 1909, later became branch manager at Los Angeles, returned to Chicago in 1913, and was made manager of the conveyor and elevator belt department in 1918. His first real contact with the automotive industry started in 1920 when he was appointed central district sales manager for U. S. Rubber, handling all commodities made by the mechanical goods division at that time.

In 1927 Mr. Abramson was placed in full charge of U. S. Rubber's automotive sales, operating out of Cleveland where the plant for auto parts was then located. In 1931 the plant was moved to Detroit at which time the Auto Parts Division acquired its present name of the Motor Products Division. In all his years of contact with the automotive industry Mr. Abramson was known not only as a "rubber peddler" but as an efficient expeditor and engineer.

U. S. Rubber has formed a Twenty-Five Year Club, with James W. Harley as president, and Chester J. Noonan and J. Chester Ray as vice-presidents. Service pins were recently awarded to over 260 employees of the New York office with more than twenty-five years of service.

OFFER GERMAN REPORTS ON HEAT SENSITIZATION PROCESS

The manufacture of synthetic rubber thread, sponge rubber and rubber articles in general by the heat sensitization process is described in one of five reports on German synthetic rubber development and production now on sale by the Office of Technical Services, Department of Commerce.

The reports, prepared for the Office of Rubber Reserve, contain information on styrene and Buna S production at the I. G. Farbenindustrie plants at Huls and Schkopau, development of new styrene catalysts at Ludwigshafen, and heat sensitization of buna latices. The latter report was written by Dr. Sinn of the IGF Central Rubber Laboratory at Leverkusen, and was translated by Dr. S. H. Maron of the Case School of Applied Science.

According to the report on "Heat Sensitization of Buna Latices" (PB-80754, mimeographed, 23 pages, 75c), many technical processes for the preparation of rubber articles such as thread, sponge and molded goods are based upon the sensitization of natural latices to heat, the report states. Technically, this is accomplished by adding to the 60 per cent ammonia (NH_3) containing latex or latex mixture capable of vulcanization weakly acting coagulants, mostly solutions of ammonium salts or dilute solutions of sodium silicofluoride. The salts do not produce any coagulation in the latex at room temperature but when the sensitized mixture is heated, spontaneous coagulation of the latex takes place. The coagulum has the form of the vessel in which the heating of the latex was conducted. The report contains numerous formulas and tables detailing the physical and chemical characteristics of experimental products.

The four other reports are:

Styrene Production at Schkopau (PB-80756, mimeographed, 7 pages, 25c): This is a translation of a German report and describes the production of Buna S-3, ethylbenzene, and styrene at the Schkopau plant of I. G. Farben, the largest German synthetic rubber plant, with a monthly capacity of 6,000 tons of Buna S-3. Butadiene production at Schkopau includes conversions of calcium carbide to acetylene, acetylene to acetaldehyde, acetaldehyde to aldol, aldol to butol, and dehydration of the latter to form butadiene. Styrene is produced by dehydration of ethylbenzene which in turn is produced from ethylene, benzene and aluminum chloride. Ethylene is produced by hydration of acetylene.

Development of the New Styrene Catalyst (PB-80757, mimeographed, 12 pages, 50c): This is a translation of a review prepared for a technical meeting held at Ludwigshafen, July 29 and 30, 1944, and describes experiments for improving styrene catalyst at the Styrene Laboratory. Scarcity of the styrene catalyst (50 per cent zinc oxide, 40 per cent aluminum oxide and 10 per cent calcium oxide) led the Styrene Laboratory to investigate preparation of its own oxides. The report contains a detailed account of experience with the new styrene catalysts No. 49, Lu 82, and Lu 144 G. The latter two, for which patent applications were filed, were found most satisfactory.

Styrene Production at Huls, Germany, (PB-80755, mimeographed, 12 pages, 50c): This report describes the production of styrene and ethylbenzene at the Huls plant, which used processes similar to those employed at Schkopau.

Buna S Production at Huls, Germany (PB-80758, mimeographed, 13 pages, 50c): This report describes the production of both butadiene and Buna S. A table presents the disposition in various departments of the 9,231 German and foreign employees.

Orders for the reports should be addressed to the Office of Technical Services, Department of Commerce, Washington 25, D. C., and should be accompanied by check or money order, payable to the Treasurer of the United States.

Conversion Costs Recovered

The Pliofilm Department, Chemical Products Division, Goodyear Tire & Rubber Co., Akron, Ohio, has established a program enabling packaging machine operators to convert their equipment for the use of Pliofilm and to recover the cost of the operation. The program evolves around a merchandise credit system applying on purchases of Goodyear's Pliofilm. Company officials stated that the program was established to permit potential users of the material to use machines built to handle other types of packaging material. To illustrate the machine conversion program Goodyear has produced a sound movie showing a number of machine types successfully converted for the use of Pliofilm.

Thiokol Awarded Contract

A contract has been awarded the Thiokol Corp., Trenton, N. J., by the United States Army Ordnance for research and development work on fuels used for jet propulsion, particularly JATO (Jet Assisted Take Off) units. Work has started at a site located near Elkton, Md.

CARBON BLACK PRODUCTION ACHIEVED NEW HIGH IN 1947

Production of carbon black in 1947 reached the all-time high of 1,318,474,000 pounds, consisting of 645,128,000 pounds of channel black and 664,346,000 pounds of furnace black, according to the U.S. Bureau of Mines. This compares with production of 1,244,421,000 pounds in 1946, of which 619,109,000 pounds were channel and 625,312,000 pounds were furnace blacks.

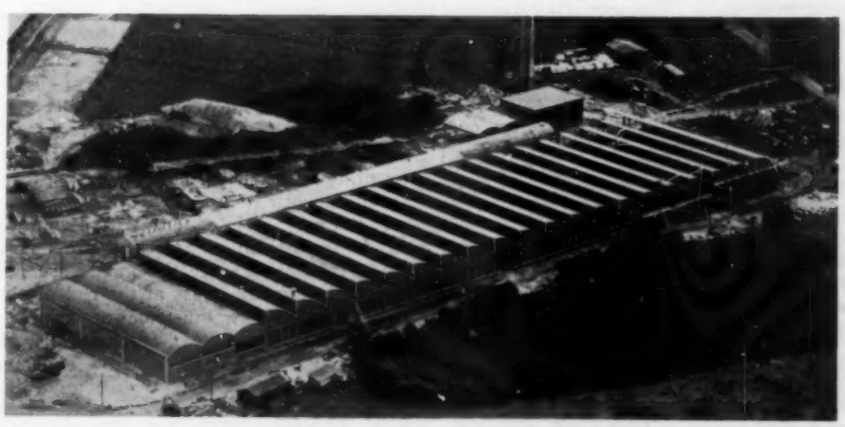
Shipments of carbon black, according to the report, totalled 1,322,298,000 pounds last year (664,178,000 channel and 658,120,000 furnace) against 1,270,198,000 pounds in 1946 (667,059,000 channel and 603,139,000 furnace). Stocks at the end of 1947 amounted to 72,404,000 pounds, of which only 6,956,000 pounds were of channel black. Total stocks on hand at the end of 1946 were 76,228,000 pounds, of which 17,006,000 were channel black.

Production in December, 1947, amounted to 115,642,000 pounds, as compared with 112,957,000 pounds in November, while shipments increased from 104,619,000 pounds in November to 112,832,000 pounds in December. Exports in December reached 22,251,000 pounds as compared with 16,145,000 pounds in November. Exports for the year of 1947 totalled 319,076,000 pounds, against 271,085,000 pounds in the previous year.

May Split Farrel Stock

Stockholders of the Farrel-Birmingham Co., Ansonia, Conn., at their annual meeting on March 18, will be asked to approve a two-for-one stock split which will increase capital stock from 200,000 shares of $25.00 par to 400,000 shares of $12.50 par. The company manufactures rolls, castings, machinery, gears and gear drives, and has plants in Ansonia and Derby, Conn., and Buffalo, N. Y. The company has 780 stockholders residing in 26 states.

NEW TIRE PLANT OF "VREDESTEIN" IN HOLLAND PUT INTO OPERATION



An over-all view of the new tire plant of N. V. Nederlandsch-Amerikaansche Autobandenfabriek, "Vredestein," located in Enschede, Holland, with which the B. F. Goodrich Company is associated, is shown above. The plant, which recently went into production, is designed to produce both passenger car and truck tires and tubes.

PANEL DISCUSSION FEATURE MEETING OF THE AKRON RUBBER GROUP

The largest attendance in history, except for some of the summer outings, turned out for the mid-winter meeting of the Akron Rubber Group held on February 6 at the Mayflower Hotel in Akron, Ohio. An afternoon program consisting of technical papers by two outstanding speakers, who were aided in answering questions by two panels of experts, was followed by a dinner and an evening of entertainment.

The first speaker was Carey Mann, manager of the Cleveland Engineering Department of the Westinghouse Electric Corporation, who discussed "Radio Frequency Applications in the Rubber Industry." His panel included G. P. Bosomworth, of the Firestone Tire and Rubber Company; H. J. Shively, of the B. F. Goodrich Company; and H. R. Neighbours of the United States Rubber Company, Mishawaka.

Second speaker was Donald F. Fraser, manager of the rubber division of the Monroe Auto Equipment Company, who talked on "Injection Molding of Rubber Goods." His panel, drawn from all parts of the country, included Herman Boxser, Acadia Synthetic Products Division of Western Felt Works, Chicago; Howard M. Dodge, General Tire and Rubber Company, Wabash; John F. McWhorter, Ohio Rubber Company; and James L. Woodruff, Gates Rubber Company, Denver.

Following a social hour and dinner, engineers of the Ohio Bell Telephone Company gave an interesting demonstration of modern methods of communication. Many tricks such as the scrambling of speech, transmission of sound on light beams, use of throat microphones, and others were displayed for an appreciative audience.

This was the first time the technical panel type of program has been attempted by the Akron Group. The fact that there was a recorded attendance of 467 and, in addition, many other persons attended, the talks attested to the popularity of the idea with the membership. This was particularly pleasing to the committee in charge of the affair since there had been some doubt as to how this kind of program would be received. The committee consisted of Robert H. Crossley, Caldwell Company; E. L. Stangor, DuPont; and Ralph F. Wolf, Columbia Chemical.

Radio Frequency Applications

Mr. Mann, the first speaker, stated that the possible use of high frequency currents was first conceived in the 1860's but no industrial application was made until the 1930's and acceptance of the method by the rubber industry in this country dates only from 1944. Necessity for close attention to the type of ingredients and the thoroughness of their mixing in preparing rubber compounds for this type of cure was stressed.

Mr. Mann pointed out that while high frequency is the most expensive method of generating heat it is also the most efficient known and therefore justifies more thorough investigation than is sometimes granted. Mutual understanding of the problems involved by the equipment manufacturer and the industry user is essential to a satisfactory evaluation of this new production tool.

Complete equipment for high frequency curing includes a high voltage rectifier; radio frequency oscilator; energy transfer components such as transmission line, electrodes and load matching device; and work handling fixtures. The latter may be designed either for batch processes or for continuous operation. When adaptable to continuous processes, high frequency curing often shows substantial savings over conventional curing methods due to elimination of intermediate handling operations.

The problem of handling energy radiations which result in radio interference was also discussed by Mr. Mann who stated that automatic frequency control within the generator itself is more satisfactory than shielding.

The mold problem was thoroughly discussed and it was pointed out that molds must have electrical and thermal characteristics comparable to those of the product being treated as well as sufficient mechanical strength to resist molding pressures. The finding of satisfactory mold materials is still one of the biggest problems confronting those attempting to use high frequency heating for articles cured at high pressure. Low pressure forms such as those used for foamed latex have been successfully produced with wood and with impregnated glass fiber.

In closing, Mr. Mann expressed a great deal of optimism for the future of high frequency in the rubber industry and pointed to the increasing number of units constantly coming into use as evidence that the method is here to stay.

Injection Molding of Rubber

According to Mr. Fraser, the original equipment for the injection molding of rubber was developed by Walter P. Cousino, of the Chrysler Corporation. The Monroe Auto Equipment Company was licensed to develop and market this type of machine in 1943.

One fundamental difference between this machine and an ordinary extruder consists in the use of two "baffle" gears which mesh with the screw and serve as a mechanical pressure lock. Another difference is use of a screw having a delivery capacity potentially greater than the amount of stock that can be delivered through the nozzle. This causes churning of the rubber compound in the barrel and conversion of mechanical energy into heat energy resulting in the rubber being at curing temperature when it goes into the mold.

Mr. Fraser pointed out that design of molds for use in an injection press is a study in itself. Since the molds are not removed from the press at the end of the curing cycle they must be designed so that the rubber parts are automatically removed as the mold is opened. The size of the runners and gates in the mold depends on the size of the article being molded and the type of compound to be used. Synthetic compounds, for example, require smaller runners than natural rubber. Type of rubber used also determines the range of curing temperatures used, neoprene molding most successfully at temperatures higher than GR-S or nitriles, and the two latter at temperatures higher than those used for natural rubber.

According to Mr. Fraser, injection molding does not call for use of "dynamite" accelerators but, on the contrary, for a relatively slow type of accelerator.

The use of the injection molding type of equipment is another step toward the "mill-less mill room" of the future, according to the speaker. Mr. Fraser described briefly the present layout at the Monroe plant where Banbury mixed compounds are pelletized and automatically conveyed to hoppers which feed directly into the extrusion machines.

Visit Vanderbilt Laboratory

The Winter Meeting of the Connecticut Rubber Group on February 13 consisted of an inspection tour of the R. T. Vanderbilt Laboratories at South Norwalk, Conn. Approximately 55 members and guests were conducted through the laboratories despite the fact that the day was marked by a rainstorm which turned to ice and made travelling conditions extremely hazardous. The visitors were conducted through the ceramics, latex, rubber, paper, paint, foods and specialties departments maintained by Vanderbilt, each department being staffed by personnel who answered all questions and made requested demonstrations. Gus Maassen, of the Vanderbilt organization, made the inspection trip possible.

Akron Meets on April 16

Joseph C. Thompson, Jr., assistant general paint manager of the Pittsburgh Plate Glass Co., and Philip H. Wiegand, of the technical department of the same company, will address the next meeting of the Akron Rubber Group, to be held on Friday, April 16, at the Mayflower Hotel in Akron. Mr. Thompson will speak on "Color Dynamics and its Application to Industry," in which he will explain the scientific use of the psychological factors of color to increase efficiency. "Industrial Finishes and Finishing" will be Mr. Weigand's topic, and he will deal with surface preparation techniques, application of coatings, types of finishing systems, and composition and use of organic finishes.

Field and Myers to Speak

The Spring Meeting of the Boston Rubber Group to be held on March 19 at the Somerset Hotel, Boston, Mass., will be addressed by George E. Field, technical staff representative of the B. F. Goodrich Chemical Co., Cleveland, Ohio. Mr. Field will speak on "Processing and Physical Characteristics of Geon Polyblends." At the same meeting, Dr. R. J. Myers, head of the Applications Laboratory of the Resinous Products and Chemical Co., Philadelphia, Penna., will speak on "Plasticizers for Rubber and Polyvinyl Chlorides." The Spring Meeting marks the 20th Anniversary of the Boston Rubber Group.

SYMPOSIUM ON CARBON BLACK HELD BY CHICAGO RUBBER GROUP

Approximately 130 members and guests attended the February 6 meeting of the Chicago Rubber Group at the Morrison Hotel, Chicago, Ill. A symposium on "Carbon Black in Rubber Compounding," arranged by the technical staffs of the Binney & Smith Co. and the Columbian Carbon Co., highlighted the meeting.

J. W. Snyder, of Binney & Smith, was the first speaker of the evening. Mr. Snyder gave a talk reviewing the three principal methods of manufacturing carbon black—channel, furnace and thermal. He discussed the fundamental properties of the "building stones" of carbon blacks, namely, surface, pH, and structure.

Mr. Snyder pointed out that the electron microscope has made it possible to measure directly the size of the carbon particles. The adaptation of stereoscopic methods to electron photomicrographs clearly visualized the concept of structure and it was shown that the chemical nature of the carbon surface controls pH, the third "building stone."

H. A. Braendle, of the Columbian Carbon Co., then continued the discussion and showed the effect of these "building stones" on rubber compounds. Suggestions were made as to the selection of the proper grade of carbon for specific uses.

With the advent of VFF carbon, such as Statex K, a new quality level has come into being, according to the speaker. Due regard must be given to the influence of fundamental properties on processing and curing behavior of rubber compounds containing VFF carbon, the speaker stated. The balancing of carbon loading, type and amount of softeners, accelerator and sulfur dosages were fully discussed.

C. R. Haynes, of the Binney & Smith Co., secretary of the Rubber Division of the American Chemical Society, was presented to the Group. He made a plea for more papers to be presented at the April meeting of the Division. D. F. Cranor, F. A. Bonstedt and R. A. Emmett, all of Binney & Smith, were also presented at the meeting.

Boston Summer Outing

The Boston Rubber Group has announced that its annual summer outing will be held this year at the Woodland Golf Club, Newton, Mass., on June 18, under the direction of R. E. McCurdy, Chairman of the Outing Committee. The Fall Meeting will be held on September 24, at the Somerset Hotel in Boston. The Winter Meeting and Christmas Party will be held on December 17, at the Somerset Hotel.

Chicago Meets on March 26

The March meeting of the Chicago Rubber Group will be held on March 26 in the Morrison Hotel, Chicago, Ill. Major Howard T. Markey, Commanding Officer of the 46th Air Reserve Fighter Squadron, will present an illustrated talk on his experiences as a test pilot. Major Markey was one of the original test pilots for jet propelled planes for the U. S. Air Force.

Greer Named Technical Director

Harvey G. Greer

Harwick Standard Chemical Co., Akron, Ohio, has announced the appointment of Harvey G. Greer as Technical Director. Mr. Greer will be in the Akron offices of the company where he will serve in both a sales and advisory capacity on product development and compounding problems for accounts. Mr. Greer served in compound development for the Goodyear Tire & Rubber Co. prior to the war and was secretary of Rubber Reserve's Compounders Committee during the war. Subsequently he was development manager for the Continental Carbon Co. In his new position, Mr. Greer will expand further the cooperative service of working out Harwick Standard Chemical product applications for a growing diversity of compounding needs.

Toulmin Addresses Ohio Group

H. A. Toulmin, Jr., member of the firm of Toulmin & Toulmin, patent counsel, and chairman of the board of the Commonwealth Engineering Corp., was the principal speaker at the meeting of the Southern Ohio Rubber Group, held on February 20 at the Engineer's Club in Dayton, Ohio. Mr. Toulmin discussed "Making Profits from Patents" and held his audience for over an hour. A lively question-and-answer period followed the talk. The DuPont sound film, "The Story of Neoprene," was also shown at the meeting. At the business session, the membership voted to seek the official sponsorship of the Rubber Division, A.C.S., and a special committee was named for this purpose. The committee consists of Stewart L. Brams (Dayton Chemical Products), Herman E. Wening (Inland Mfg.), R. A. Clark (Battelle Memorial), and Andrew Wightman (Dayton Rubber). It was also announced that Raymond K. Ritzert (Dayton Rubber) will act as chairman of the outing to be held on June 5, Bernard Adinoff (Dayton Rubber) for the September meeting, and Howard L. Rucker (Dayton Rubber) for the December meeting.

CONFERENCE TO BE HELD ON ELECTRICAL PROBLEMS

The Subcommittee on Rubber and Plastics Industries of the General Industry Applications Committee of the American Institute of Electrical Engineers, in conjunction with the Akron Section of the Institute, will sponsor a one-day technical conference on "Electrical Problems in the Rubber and Plastics Industries" in Akron, Ohio, on Tuesday, April 20. The conference will be held in the auditorium of the O'Neil department store from 8:30 A.M. to 5:30 P.M

Seven papers are included in the program, and ample provision will be made for extensive discussion after each paper. K. W. John (U. S. Rubber) will preside at the meeting. Titles and the authors of papers scheduled are as follows:

1. "Electric Power Systems for Small Rubber Plants" by B. D. Morgan, Johnson & Johnson Co., R. S. Ferguson, Goodyear Tire & Rubber Co., and H. J. Finison, General Electric Co.

2. "D. C. Spot Conversion for Rubber & Plastics Manufacturing Plants" by C. E. Robinson, Reliance Electric & Engineering Co.

3. "Separate Electrical Equipment Rooms vs. NEMA Enclosures for Protection of Motors and Control" by F. A. Green, B. F. Goodrich Co.

4. "Electric Braking of Rubber Mills and Calendars" by B. J. Dalton, General Electric Co.

5. "Classification of Electric Drive Characteristics for Rubber Machinery" by A. T. Bacheler, Westinghouse Electric Corp.

6. "The Measurement and Control of Tension and Its Relation to Motor Input" by H. L. Smith, General Electric Co.

7. "Temperature Measurement and Controls in the Rubber and Plastics Industries" by F. L. Spangler, Leeds & Northrup Co.

Quebec Group Hears Farrell

Approximately 50 members and guests attended the January 8 meeting of the Quebec Rubber and Plastics Group held at the Ritz-Carlton Hotel, Montreal, Quebec, Canada. W. T. Farrell of Arnold Banfield & Co., Ltd., was the principal speaker of the evening. Mr. Farrell spoke on "The Formica Story," in which he traced the origin of Formica and its development up to the present where this product is found in extensive use industrially, commercially and in the home. The talk was followed by the showing of a colored film, "What are Laminated Plastics?" The film covers the manufacturing of the plastic material, methods of working and machining, and its use for various products.

A technical report on the prevention of sticking of Silene EF loaded GR-I compounds has been made available by the Columbia Chemical Division of the Pittsburgh Plate Glass Co. It covers the use of butoxyethyl diglycol carbonate.

FINANCIAL NEWS

U. S. RUBBER'S 1947 SALES REACHED AN ALL-TIME PEAK

Consolidated net sales of the United States Rubber Co. in 1947 reached the all-time peak of $580,968,091, a 17.4% gain over sales of $494,753,028 reported for 1946, according to a statement issued by the company. Net income, however, dropped to $21,753,317, or $9.39 a share on the common stock, from the $23,207,941, or $10.23 a share, in the previous year.

The figure of $580,968,091 represents outside sales only. The value of production transferred to allied plants amounted to $90,351,551, and the estimated value of synthetic rubber produced by the company was set at $31,000,000. Accordingly, the total of $702,319,642 is actually the real measure of the year's activities, according to the report.

Direct taxes of $65,349,398 were charged against operations in 1947, against taxes of $62,366,782 for 1946. The company also forwarded to the Government a total of $23,027,563 as income and social security taxes paid by its employees. As a result of tremendously increased business, the company found it desirable to raise $63,550,000 additional funds by new financing during 1947.

The balance sheet of the company showed current assets of $252,141,343 against current liabilities of $81,988,939, giving a net working capital of $170,152,404 compared with $118,483,788 for the previous year, an increase of $51,668,616.

Total inventories were $121,362,263 as of December 31, 1947, against $101,086,716 for 1946. Foreign assets of $43,511,073 showed an increase of $8,504,605, due to increased activities in Canada, Europe, Latin America and on the Malayan plantations.

An average of 66,765 employees, excluding those on the plantations, received a total of $208,638,529 in wages and salaries during the year, or $3,124 per employee. This compares with $182,652,076 paid last year to an average of 61,499 employees, an average of $2,970 per employee.

The company's natural rubber plantations in Malaya, which were recovered at or shortly after January 1, 1946, were in full operation during the year 1947. The net recovery value of $3,418,488 has been retained in general reserve because of uncertainties in the economic and political situation and because Federal income tax determinations are also involved.

Additions to property and plant during the year amounted to $25,380,527, exclusive of rubber plantation properties. Deductions including depreciation, disposals and adjustments totaled $11,280,390, leaving a net increase of $14,100,137.

Expenditures for the rubber plantations amounted to $2,185,099. Deductions including depreciation, disposals and adjustments amounted to $691,969, causing a net increase in plantation property and plant of $1,493,130.

The company operated four Government-owned synthetic rubber plants during all or a part of the year. The plant at Los Angeles was closed in July. The plant at Institute, West Virginia, was closed in November. The plant at Borger, Texas, was taken over from the previous operators as of October 1. The plant at Naugatuck, Connecticut, was operated throughout the year.

While under the supervision of the company, these plants produced a total of 196,000,000 pounds of various synthetic rubbers during 1947, with an approximate value of $31,000,000. This value is not included in net sales. The net income of $933,767 received for operating these plants was included in other revenue.

GOODYEAR'S 1947 SALES MOUNT TO RECORD PEACETIME TOTAL

Sales of the Goodyear Tire & Rubber Co. last year were $670,772,647, a record peacetime volume that compared with $616,508,162 in 1946. The consolidated net income for 1947 amounted to $33,044,943, from which $7,500,000 was set aside for possible losses in connection with foreign investments. The earnings before this reserve were equal to $14.56 a common share and to $10.93 a share after deducting the reserve. In 1946 net earnings after reserves of $15,000,000 were $36,211,784, equivalent to $16.07 a common share.

Current assets at the end of 1947 amounted to $291,453,679, including cash of $63,411,050 and inventories of $149,453,679. Current liabilities were $48,410,688. At the close of 1946 current assets were $223,190,673, of which cash was $50,792,703 and inventories were $101,684,827. Current liabilities stood at $48,630,459.

In connection with the reserve for foreign investments, the company statement pointed out that governmental exchange restrictions in various foreign countries tended to prevent the transfer of profits. Income from subsidiaries outside the United States consolidated in the income account amounted to $15,740,000.

Dividends and other income totaling $8,943,000 were received from these companies in 1947. The remainder was invested in foreign fixed assets or added to foreign working capital. The 1947 appropriation brought reserves for foreign investments to $12,500,000 and increased total reserves to $45,626,701, compared with $36,602,104 at the end of 1946.

All factories were said to have operated at virtual capacity without interruption throughout 1947. The company's factory in South Africa, started a year ago, is in full operation. Most of the expansion program should be completed this year.

GENERAL CABLE CORP. REPORTS 1947 NET INCOME OF $6,158,265

Operations of the General Cable Corporation for the year of 1947 resulted in a net profit of $6,158,265 after taxes and all charges. The profit is equivalent to $2.79 a share on the 1,898,614 shares of common stock outstanding and compares with the net for 1946 of $3,045,421, which was adversely affected by work stoppages at several of the company's plants.

Current assets on December 31, last, amounted to $45,439,625 and current liabilities to $7,402,517, compared with $27,922,217 and $6,754,142, respectively, at the close of 1946. Earned surplus, which had decreased from $13,361,698 at the end of 1945 to $5,678,199 at the close of 1946, principally owing to charges relating to the recapitalization plan, increased during 1947 to $10,239,695.

Inventories carried at $10,208,371 at the beginning of 1947 were reduced to $8,421,138 on last December 31. As was the case at the end of 1946, under the "last-in, first-out" method of inventory valuation used by the corporation, the copper inventory at the end of 1947 was valued at 12 cents a pound.

Brown Rubber Company

For 1947: Net profit of $810,890, after provision of $501,533 for Federal taxes and $48,735 for depreciation, which is equal to $3.23 a share, and which compares with $361,728, or $1.44 a share, reported for the previous year. Profit from 1947 operations prior to deductions amounted to $1,359,669. The consolidated balance sheet as of December 31, 1947, indicated total current assets of $1,333,164, including $622,560 in cash, $30,277 in notes receivable, $377,567 in accounts receivable and $301,051 in inventories. Total current liabilities amounted to $369,560, including $148,627 in accounts payable, $119,532 for accrued wages and taxes, and $101,400 for Federal taxes.

Mohawk Rubber Company

For 1947: Net profit of $499,619, which is equal to $3.53 a common share, on net sales of $8,242,956, compared with net profit in 1946 of $1,044,689, or $7.37 a share, on net sales of $10,088,446. The consolidated balance sheet as of December 31, 1947, revealed total current assets of $2,838,730, including $849,329 in cash, $597,152 in accounts receivable, and inventories of $1,272,029. Total current liabilities amounted to $257,474, including $224,041 in accounts payable, credit balances of $15,058, local taxes of $14,976 and unclaimed dividends of $3,397.

Plymouth Rubber Company

Year Ended Nov. 30: Net profit of $1,126,226, which is equal to $1.25 each on 900,000 common shares, and which compares with $2,149,549, or $2.38 a share, for the previous fiscal year. A strike closed the company's plants for approximately one month during the 1947 fiscal period.

GOODRICH COMPANY REPORTS HIGHER SALES, LOWER INCOME

Greatest rubber consumption in the company's history, reflected in highest sales for any peacetime year, but with 7.8 per cent lower net income than in 1946, has been reported by the B. F. Goodrich Company in a preliminary statement of its 1947 business. Consolidated net sales amounted to $410,180,839, compared with $361,471,149 in 1946, an increase of 13.5 per cent.

After provision for estimated federal and foreign taxes on income and after providing for reserves of $6,500,000 for possible inventory price declines, inflated cost of property additions and replacements, foreign losses and other contingencies, net income amounted to $23,231,063 after all charges, or $[illegible] per share of common stock outstanding after deducting the regular $5.00 dividend on preferred stock; this compares with $17.69 a common share in 1946. Net income in 1946 was $25,207,871 after provisions for taxes and for reserves of $10,500,000 for contingencies and obsolescence.

Dividends paid during the year were $5.00 per share on preferred stock and $5.00 per share on common stock, the latter including a dividend of $1.00 paid at year-end.

Current assets on last December 31 amounted to $165,772,294 and current liabilities to $35,053,680, compared with $146,778,955 and $33,451,077, respectively at the end of 1946. Inventories at the year end totalled $88,940,417, compared with $78,531,128 a year earlier.

Preferred stock is shown at the call or liquidation value of $100 a share instead of the previously stated $60 a share. Earned surplus that aggregated $56,289,128, against $58,141,060 on December 31, 1946, was reduced by the amount required for this purpose.

Capital employed outside the United States at the end of 1947 was $14,712,000, of which $5,283,000 was in Canada. Of the total, $10,087,000 was applied to net current assets and $4,625,000 to net other assets.

Signed by David M. Goodrich, chairman, and John L. Collyer, president, the report stated that "the war-deferred demand for rubber products was largely satisfied and inventories for the most part were replenished by the end of 1947," and indicated that taxes, excluding domestic sales taxes, applicable to 1947 amounted to $48,327,000 and equalled $36.94 per share of the company's common stock.

United Carbon Company

For 1947: Net income of $3,159,138, which is equal to $3.97 per share, and which compares with $3,010,284, or $3.79 a share after adjustment for the 2-for-1 stock split in May, 1947. Net sales amounted to $23,915,596, as against $22,322,818 in 1946. Operating profit in 1947 before deductions but after depreciation amounted to $6,623,920. Of total sales in 1947, 72.2% came from sales of carbon black as compared with 74.3% in the previous year.

Establishes Consulting Service

H. H. Bashore

H. H. Bashore, well-known rubber technologist with over twenty years of experience in the rubber manufacturing field and inventor of the widely used Bashore Resiliometer and other testing instruments, has established a consulting service under his own name at 1 North Lasalle St., Chicago 2, Ill. The telephone number is Andover 1538. Mr. Bashore offers services covering research, development, production and sales engineering, and based on his experience that many problems do not lend themselves to immediate solutions has arranged his schedule so that when necessary he can travel anywhere and stay with a particular problem for weeks on end if necessary until a satisfactory solution is determined. Among Mr. Bashore's many achievements has been the organization and equipping of several complete laboratories, as well as the organization of a technical sales and service department for a prominent concern. His new consulting service will cover both rubber and plastics.

Sponsor Two Panel Discussions

Two panel discussions on the general theme "Engineering with Rubber" will be sponsored by the Chicago Rubber Group in conjunction with the forthcoming Chicago Technical Conference and Production Show. The panels, one in the early afternoon and the other in the late afternoon, will be held at the Stevens Hotel in Chicago on Wednesday, March 24, with Dr. H. A. Winkelmann (Dryden Rubber) presiding as moderator. The first panel will consist of two papers, one on "Rubber Tires of the Future" by E. F. Benson (Inland Rubber) and the other on "American Oil Resistant Rubbers" by A. I. Brandt (Goodrich Chemical). The second panel will also include two papers, the first on "Engineering with Sponge Rubber" by C. S. Yoran (Brown Rubber) and the second "Engineering with Adhesives" by Fred Wehmer (Minnesota Mining).

GENERAL TIRE & RUBBER CO. REPORTS NET OF $5,872,472

The General Tire & Rubber Co. has reported net income of $5,872,472 for the year ended November 30, 1947, after all charges including a provision of $3,898,000 for Federal income taxes and a $264,000 subsidiary tax carryback credit. This is equal to $9.08 a common share and compares with $5,734,955, or $9.05 a share, reported for the previous fiscal year, which included a special credit of $170,176. Net sales for the 1947 fiscal period amounted to $126,136,242, against $105,883,559 in the previous year, a gain of 19.1%.

In a report accompanying the statement William O'Neil, president, pointed out that the company's net current position is $24,488,402, a gain of $3,431,367 over the 1946 position, and added that the gain was made through earnings and not through the additional sale of securities. Current assets at the end of November 30, 1947, amounted to $42,409,458, and current liabilities to $17,921,055, as compared with $43,275,073 and $22,218,038, respectively, at the end of the previous fiscal year.

Operations of the Aerojet Engineering Corp., a subsidiary, continued to expand, the report stated. The company's radio network, and its foreign operations in Mexico, Chile, Venezuela and Portugal, in addition to Canada, proved highly successful. Construction of plants of affiliates in South Africa and Argentina is expected to begin this year.

Lee Rubber & Tire Corp.

Dollar sales of the Lee Rubber & Tire Corp., Conshohocken, Penna., in the initial quarter of the fiscal year beginning November 1, 1947, were off about 4½% from the previous year when sales for the period reached $9,272,000 as opposed to $8,885,000 for the present period. By the end of the calendar year the company had built up a cash balance of $6,700,000. Company officials stated that no new financing was contemplated this year. The company's mechanical goods division which has a good backlog, accounted for about 40% of the total sales volume. On the other hand, replacement sales of tires for automobiles in the coming year are expected to decline between 15-20% industry-wide. Sales of replacement tires for trucks and buses are expected to show a similar drop.

Dewey and Almy Chemical Co.

For 1947: Net profit of $671,086, which is equal to $2.18 each on 307,215 common shares, and which compares with $663,342, or $2.16 a share, for the previous year. Preferred stock was retired by redemption on July 31, 1946. Net sales reached a new high of $14,260,096 during 1947.

Bethlehem Foundry & Machine Co., Bethlehem, Penna., has made available a folder containing technical details of its recently developed and introduced Beth-Tec Unit. Performance data is also included.

RUBBER FOOTWEAR SALES ESTABLISH NEW RECORDS

Unprecedented snowfalls combined with sub-normal temperatures in many areas of the country commencing in late December and continuing into February, resulted in record-breaking retail sales of rubbers and overshoes in almost all sections of the country east of the Rockies, according to the Rubber Manufacturers Association.

Another nationwide association representing more than 5,000 retail shoe stores indicated that recent blizzard-inspired purchases of rubber footwear ran better than 100 percent above average for the close of December through January. This group also advised that, while abnormal weather resulted in a serious drop in shoe sales, increased volume in protective rubber footwear prevented any decline in over-all sales.

Following New York's record-smashing blizzard of December 26-27, when 25.8 inches of snow surpassed the 21.9 inches that fell during the famous blizzard of March 22-24, 1888, leading department stores reported several turnovers of rubber-footwear inventory. Sales of several thousand pairs in two or three days were not uncommon. One metropolitan chain sold 65,000 pairs of overshoes in less than a week; and in one department store men's rubber footwear sales for the first 20 days in January reached the stounding total of $117,000. Stocks of wholesalers were exhausted citywide, and manufacturers were revamping production schedules to replenish inventories.

The weather was abnormally severe, in greater or less degree, everywhere except in Southern California. In the New York, Philadelphia, Boston, and Syracuse areas, for example, temperatures averaged 22 degrees below last winter, while there was unusually heavy snowfall. Sub-freezing weather and bizzards were reported in the Gulf States.

The blizzards revealed that the inclement weather apparently caught a surprising total of people who needed new rubber footwear. But, the Association observed cheerfully, there was no influenza epidemic, and in New York City, at least, the 340 cases of pneumonia reported during January were even fewer than the total for the same month last year, which seemed to indicate that people realized that wearing of rubbers and overshoes in wet and snowy weather is an important precautionary measure against cold, which often lead into the more serious illnesses such as pneumonia.

In some communities, notably New York City, when the record snow fall caused serious traffic jams, a temporary embargo was placed on truck movement of all non-essential items. However, trucks carrying rubbers and overshoes from factories or warehouses to retail outlets were permitted full operation by public officials who recognized that protective rubber footwear was essential to public health.

Where can we get four-roll calenders? The answer is in the 1947 RUBBER RED BOOK.

Offutt Joins Richardson Co.

Harold H. Offutt

Harold H. Offutt, until recently associated with the Jefferson Lake Sulphur Co., Inc., Houston, Texas, has joined the Sid W. Richardson Carbon Co., Fort Worth, Texas, as production manager. The Richardson company is a newly formed organization that is operating a channel black plant in Odessa, Texas, recently purchased from the War Assets Administration. Mr. Offutt was first employed with the B. F. Goodrich Co., Akron, Ohio. In 1930 he joined the Godfrey L. Cabot Co., and was with that company until 1942. During this period his work covered technical sales in carbon black, manager of the rubber laboratory and development manager for the carbon black division. In 1942, Mr. Offutt became superintendent of production of the synthetic rubber plant at Baton Rouge, La., operated by the Copolymer Corp.

Additions to Cabot Staff

Godfrey L. Cabot, Inc., Boston, Mass., has announced the addition of three new staff members. Dr. W. B. Pings, formerly associated with E. I. du Pont de Nemours & Co., has been employed to head up a newly established group working in the field of organic chemistry. He is a graduate of Iowa University and received his doctorate at the University of Minnesota. Samual Kahn, who received his Master's degree in organic chemistry at the Massachusetts Institute of Technology, has been added to the laboratory staff to work with Dr. Pings. Kenneth W. Brown, formerly a special agent of the Federal Bureau of Investigation, has joined the Research and Development Department as a patent adviser. Mr. Brown is a graduate of Harvard College and Harvard Law School. At the same time, company officials announced that James B. Weaver of the research and development staff in Boston, has been transferred to Pampa, Texas, to study manufacture and quality control of carbon black.

PRODUCTION OF TIRE CASINGS SURPASSES PREVIOUS HIGHS

Production and shipments of automotive casings in the year 1947 surpassed any previous year in the history of the industry, according to the Rubber Manufacturers Association. Production of 95,548,391 casings in the year topped by 13,250,210 units the production figures for 1946 which was in itself a record year.

Passenger casing production for the year totalled 77,790,410 units, as against 66,466,319 units in 1946. Production of bus and truck casings amounted to 17,757,981 units, as compared with 15,831,862 units in 1946. December production of both passenger and truck and bus casings were at high levels with 6,662,352 passenger casings, and 1,427,429 truck and bus casings.

Shipments of automotive casings during the year totalled 91,194,274 units, an increase of almost 11% over the previous year when 82,312,411 units were shipped. Passenger casing shipments in 1947 were 74,116,801 units compared with 66,423,221 units in 1946. Bus and truck casings shipped in 1947 totalled 17,077,473 units, compared with 15,889,190 units the year before. Shipments of truck and bus casings were down somewhat in December, with 5,336,283 passenger casings and 1,246,362 casings moving from the factories.

Replacement shipments in 1947 were approximately on the same level as in 1946, when 65,490,247 casings were shipped. The increase in the production of passenger cars accounted for an increase in original equipment shipments of approximately eight and one-half million casings. Export shipments increased to 3,249,481 casings, as against 1,512,012 the year before.

Automotive tube production in 1947 was slightly higher than 1946 with 79,509,292 tubes, as against 77,250,995 in the previous year. In December, 6,543,644 passenger and truck and bus tubes were produced. Shipments were maintained at approximately the same level as 1946 with a total of 76,641,381 units moving from factories in 1947. A total of 5,324,193 passenger and bus and truck tubes were shipped in December.

Award to Goodyear Program

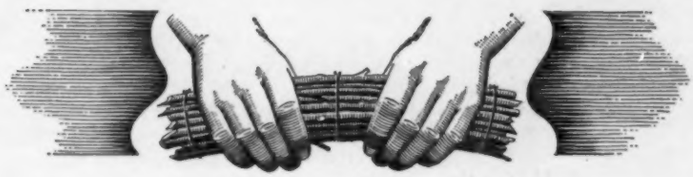
Another notable award was recently added to the imposing list of honors given to the radio program, "The Greatest Story Ever Told," sponsored by the Goodyear Tire & Rubber Co. The latest award was a citation awarded during Brotherhood Week by the National Conference of Christians and Jews for the initial program, "The Good Samaritan." The citation was given to P. W. Litchfield at a luncheon at the Portage Country Club in Akron. The American Broadcasting Co., over whose network the program is aired, also received a citation at the same time.

A reprint of the article on "The Mechanism of Reinforcement of Elastomers by Pigments," by Leonard H. Cohan, has been issued by the Witco Chemical Co. Copies are available on request to the company.

TALES WORTH RETELLING

(No. 2 of a series)

THE MEANING OF STRENGTH



A DYING OLD MAN gathered his sons around to give them some parting advice. He ordered his servants to bring in a Bundle of sticks.

"Break it," he said to his eldest son.

The son tried with all his might but was unable to break the Bundle. The other sons were also unsuccessful.

"Untie the Bundle," said the father, "and each of you take a stick."

"Now break," he said, and each easily broke his stick.

"You see my meaning," said the father.

★ ★ ★

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NAMES IN THE NEWS

L. A. McQueen, vice-president of the General Tire & Rubber Co., has been appointed chairman of the National Distribution Council of the Department of Commerce.

F. G. Arnold, associated with O. G. Maigne & Co. and its subsidiary, the Graphic Manufacturing Co., for the past three years, has left that organization and is now affiliated witth Bingham Bros. Co., New York.

Robert M. Simpson, associated with the Columbia Chemical Division, Pittsburgh Plate Glass Co., since 1944, has been appointed district sales manager of the Division with headquarters in Chicago.

Paul V. Horton, formerly chief chemist of the Plax Corporation, and previously associated with the American Hard Rubber Co. and the U. S. Rubber Co., has joined the Engineering Electronics Section, Ordnance Development Division, of the National Bureau of Standards.

William T. Exton, for many years factory superintendent of the Ball Brothers Co. at Muncie, Ind., has left that organization and will announce a new connection in the near future.

T. M. Hughes, formerly manager of accessories and repair materials sales for the Seiberling Rubber Co., Akron, has been named assistant to the company's director of sales operations.

Milton S. Greenhalgh, assistant section engineer in the wiring development section of the Works Laboratory of the General Electric Co. at Bridgeport, Conn., recently received a Charles A. Coffin award from the company for his "outstanding contributions in the field of synthetic wire and cable insulation and for improvements in manufacturing processes."

Dr. Harold Naidue, formerly senior chemist of Publicker Industries, Inc., has joined the research staff of the American Polymer Corp., Peabody, Mass. He will do research and development work on high polymers for application to the adhesive, coating and textile industries.

Knute Rittenhouse, an engineer in the inter-plant department of the General Tire & Rubber Co. at Akron, has been named factory manager of the company's new plant at Port Elizabeth, South Africa. He has already sailed to assume his new duties.

H. de Witt Smith, vice-president of the Newmont Mining Corp., has been elected a director of the St. Joseph Lead Co., succeeding Edward V. Peters, resigned.

William W. Long, until recently associated with the Seiberling Rubber Co., is now with the Swan Rubber Co., Bucyrus, Ohio, as assistant chemist.

Herbert E. Smith, president of the United States Rubber Co., has accepted the chairmanship of the Rubber Division of the Legal Aid Society's Appeal.

John Collins, formerly associated with the United States Rubber Co., has been appointed assistant general sales manager of the Michigan Chemical Corp., St. Louis, Mich.

J. J.° Whitfield, associated with the Warwick Chemical Co., New York, for many years, has been appointed national sales manager of the stearate division of that company.

Hugh Burdette, vice-president of the Cabot Carbon Co., has been elected president of the Texas Elf Carbon Co., partly owned Cabot subsidiary for the production of carbon black. E. L. Green, Jr., head of the natural gas and gasoline department of Cabot Carbon, has been elected vice-president of the company.

Joseph C. Herbert, formerly manager of the B. F. Goodrich Company's tire and tube plant in Tuscaloosa, Ala., and associated with the company since 1927, has been named assistant managing director of Industria Columbiana de Llanta, Bogota, Colombia.

Dr. Herman A. Bruson, noted for his work in the development of Plexi-Glas, has joined the Industrial Rayon Corp., Cleveland, Ohio, as head of the High Polymer Research Division.

William A. Karl, vice-president of Firestone Textiles for the past seven years, has been named president of that company. He will make his headquarters at Akron.

Ernie P. Weckesser, associated with the B. F. Goodrich Co. for some thirty years, has been appointed general sales manager of the Polson Rubber Co., Garrettsville, Ohio. He succeeds J. W. McConnell, who will continue as a director and secretary of the company.

Dr. W. R. Smith, chief research chemist of Godfrey L. Cabot, Inc., delivered a talk before the Appalachian Geological Society on February 9 in Charlestown, W. Va., on the manufacture and applications of carbon black.

Herman G. Shively, who joined the B. F. Goodrich Co. last year, has been named manager of the electronic applications development department at Akron.

Davis Joins National Kaolin

M. E. Davis

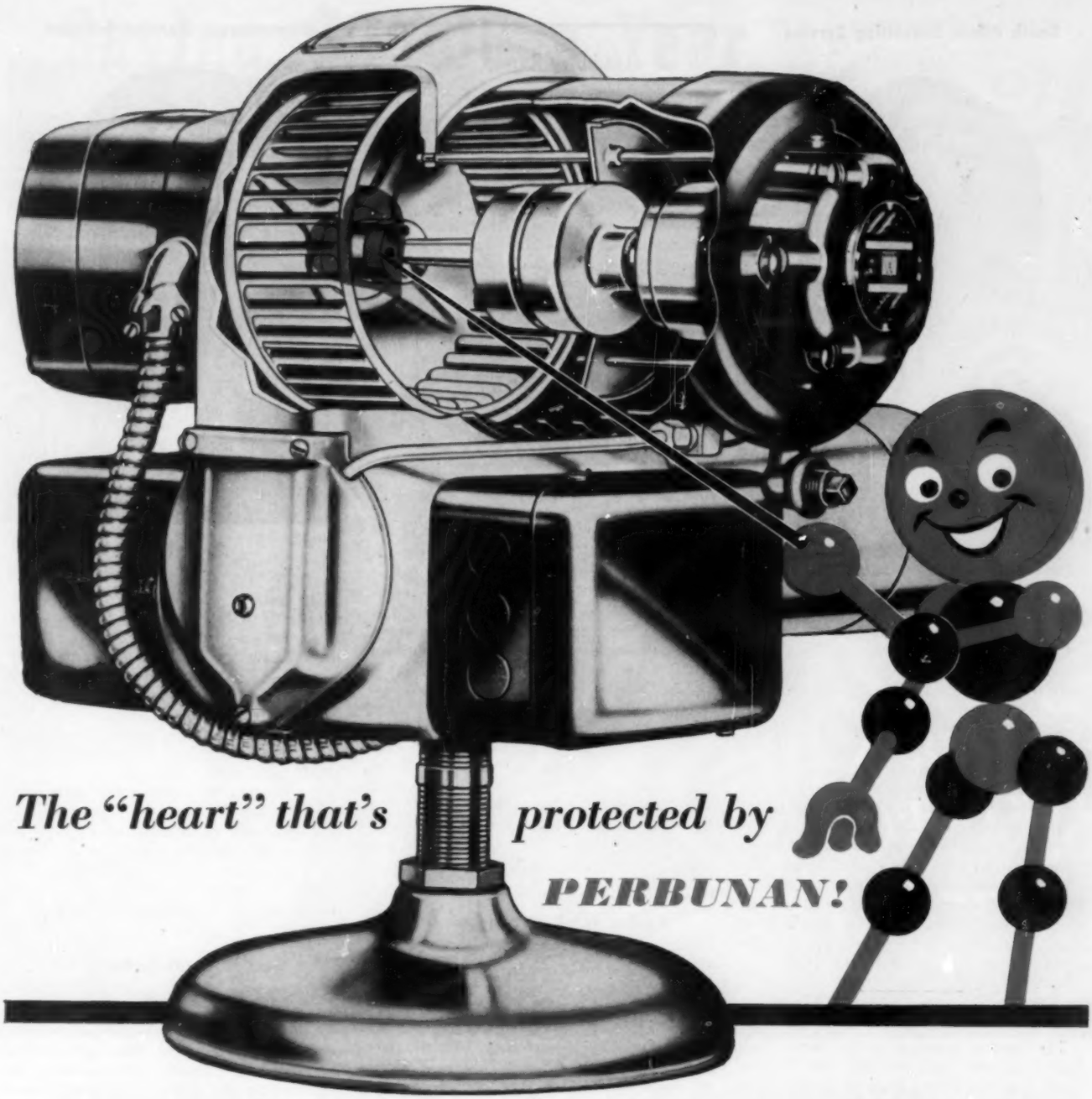
M. E. Davis, associated with the Harwick Standard Chemical Co., as manager of the Trenton, N. J., branch office for the past two years, has been named general manager of the National Kaolin Products Co. of Aiken, S. C., refiners and processors of all types of clay. Mr. Davis will have charge of both production and sales activities and will make his headquarters at 300 Twenty-sixth St., N.W., Washington, D. C. One of the rubber grades of clay made by the company is sold by Harwick Standard Chemical under the name of "Champion." Mr. Davis is a graduate of the University of Illinois, class of 1931, and has served with the A. O. Smith, Goodrich, General Tire and J. M. Huber organizations, in addition to Harwick Standard Chemical.

Robert V. Mellefont, formerly vice-president of the National Capital Bank of Washington, has been elected treasurer of the American Chemical Society, succeeding Robert T. Baldwin, who retired recently after 16 years in office.

Frank Gerrans, manager of the tire valve manufacturing plant maintained by A. Schrader's Son at Birmingham, England, has retired after 30 years of service in that post. He has been succeeded by James Sinstadt.

Barclay K. Read, recently appointed assistant sales manager of the Shell Chemical Corp., San Francisco, has been promoted to sales manager, succeeding Sidney S. Lawrence, retired.

John J. Connors has been named purchasing agent of the A. Schrader's Son Division of Scovill Manufacturing Co., Brooklyn, N. Y., succeeding the late Clarence Wilcox.



The "heart" that's protected by PERBUNAN!

• The heart of the revolutionary and patented new Gilbarco Oil Burner is the "Economy Clutch" that practically eliminates soot. It allows the burner's fan to spin freely before the oil pump is engaged to produce the flame, and again lets the fan spin after the burner has shut off.

To ease the sudden impact of the first operation some part had to be developed that would have *resilience* to absorb shock . . . *flexibility* to maintain positive alignment . . . *strength* to hold the bond between the flexible and metal parts . . . and be *silent* in operation.

The Gilbert & Barker engineers, working in cooperation with the technical experts from Graton & Knight, ran an exhaustive search and test program . . . and found that the material best suited to meet the severe demands was—*Perbunan Nitrile Rubber!*

If *you* have a problem that could be solved by a rubber that also resists oil, heat, abrasion and water...stays flexible at extremely low temperatures . . . and holds *delicate* colors—please ask for further information.

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THE RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME

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Smith Offers Consulting Service

Glenn P. Smith

Glenn P. Smith, until recently chief engineer of the Atlantic Tubing & Rubber Co. and previously associated with the Naugatuck Chemical Division of the U.S. Rubber Co., has established a consulting engineering service for the rubber, plastic and chemical industries. Mr. Smith's experience includes twelve years in the rubber and chemical field and three years in the development of the synthetic rubber program as a member of the Design Committee of the Office of Rubber Reserve. His new services include the design, installation and modernization of plants. Mr. Smith can be reached at P.O. Box 1641, Providence 1, R.I. His telephone number is Williams 4533.

New York Meets April 2

The Spring Meeting of the New York Rubber Group will be held on Friday, April 2, at the Henry Hudson Hotel, West 57th Street and 8th Avenue, New York City. As usual, the technical session will be held in the afternoon, starting at 4:30 P.M., and will be followed by dinner. Dr. R. J. Noble, executive vice-president of the Heveatex Corp., and author of "Latex in Industry," will be the principal speaker. Dr. Noble will discuss "Advances in the Technology of Latex." A talk outlining the statistical position of both natural and synthetic latices will also be given, by a speaker yet to be announced. Peter P. Pinto (RUBBER AGE) is secretary of the group.

Salaried employees of the Goodyear Tire & Rubber Co. who have 15 or more years' service will receive a three-week vacation this year instead of the customary two weeks previously granted. The increased vacation applies to those not represented by employee bargaining units in which vacations are a matter of contract.

Industry Report

The rubber manufacturing industry in general does not seem to be familiar with the fact that a special Industry Report on Rubber is available from the Government on a regular bimonthly basis. Prepared by the Rubber Unit of the Office of Domestic Commerce, Department of Commerce, this bimonthly report covers all phases of the rubber economy, and each issue is replete with current statistics and data pertaining to the rapidly changing rubber picture. Subscription cost is only 50c per year. Subscriptions, accompanied by remittance, may be sent to the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Hoopes Joins Synvar Corp.

J. M. Hoopes, until recently sales manager of the Wilmington Chemical Corp., has joined the Synvar Corporation, manufacturers of synthetic resins of Wilmington, Delaware, as a sales representative. He will make his headquarters in Wilmington. Mr. Hoopes is a graduate of Yale University and for many years was associated with the Dyestuffs and Organic Chemicals Branch of the DuPont Company, during which affiliation he sold rubber chemicals throughout the New England and Akron territories. He joined Wilmington Chemical in May, 1946, as New England representative, later became office manager at New York, and was subsequently named sales manager.

Rubber Workers Support PAC

Full support for the program of the Political Action Committee of the Congress of Industrial Organizations, including the condemnation of the third party movement of Henry A. Wallace, was voted on February 22 by 150 delegates to a six-state conference of the United Rubber Workers of America (CIO). The conference was held in Trenton, N. J. The group, representing some 30,000 rubber workers in New York, New Jersey, Pennsylvania, Maryland, Delaware and Virginia, voted full support of the PAC program, including repeal of the Taft-Hartley Law.

Issue Tlargi Year Book

The Los Angeles Rubber Group, Inc., has issued the 1948 edition of its Tlargi Year Book. Bigger and better than previous editions, it again lists all members of the group and reviews activities at various meetings and outings held during 1947. Data on rubber manufacturers and suppliers on the Pacific Coast is given, while various sections are devoted to technical information of value to rubber chemists, including rubber colors, a classification of zinc oxides, a glossary of compounding materials and flash points, explosive limits and toxicity of some common solvents.

Moyer Heads Harwick Division

A. E. Moyer

The establishment of a Plastics Division, with A. E. Moyer as manager, has been announced by the Harwick Standard Chemical Co. of Akron, Ohio. The purpose of the new division is to deal specifically with compounding and development problems on plastics and applications of thermosetting resins. Mr. Moyer was formerly director of research of the Middleport Mills, Middleport, N.Y. He was previously associated with the U.S. Rubber Co. and the Upson Co. He is a graduate of Manhattan College and subsequently continued graduate studies at the University of Buffalo, specializing in advanced organic chemistry and compounds of high molecular weight.

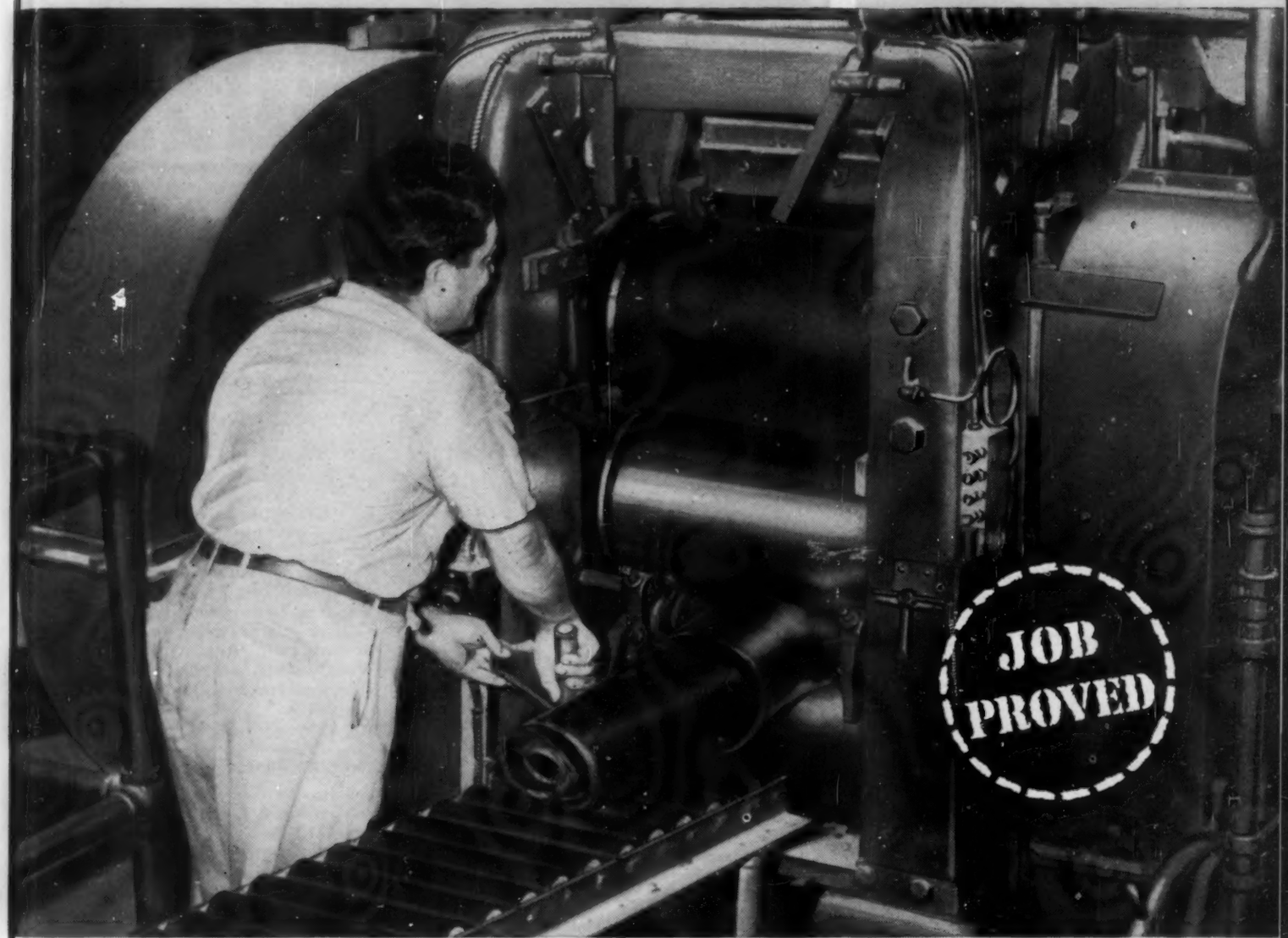
Quebec Holds Ladies Night

Approximately 250 members and guests attended the Annual Ladies Night meeting of the Quebec Rubber and Plastics Group on February 13, at the Ritz-Carlton Hotel in Montreal, Canada. Entertainment was provided by the Glee Club of the Dominion Rubber Co. The following companies contributed gift prizes which were awarded at the affair: Bolta Plastics, Ltd., Canadian General Electric Co., Canadian Industries, Ltd., Diamond State Fibre Co. of Canada, Ltd.; Dominion Rubber Co., Ltd., Tooke Bros., Ltd., British Rubber Co. of Canada, Ltd., Naugatuck Chemical Co., Monsanto (Canada) Ltd., and the Northern Electric Co., Ltd.

The telephone number of the New York office of the Flintkote Co. has been changed to PLaza 7-5500. The night connection of D. C. Cochran and G. N. Brunt, of the Rubber Division, is PLaza 7-5504.

The name of the Highland Chemical Co., distributors of friction materials specialties, has been changed to the Fleming Chemical Co. Headquarters continue at 133 Front St., New York 5, N. Y.

Saving $2,000 a Year



SUNDEX RUBBER PROCESSING AID...

Gives Greater Strength and Wear-Resistance to GR-S Stocks for Heavy Footwear

A manufacturer of heavy rubber footwear recently tested samples of GR-S rubber made with Sundex 53, and samples made with three other products, including his regular processing aid. In every case the rubber that had been plasticized and softened with the Sun product had better tensile strength and gave better results in elongation and abrasion tests.

A saving of $2,000 a year was effected in this plant as a result of changing to Sundex 53 — a higher quality product that costs less.

Sundex 53 is clean, uniform and easy to handle. It can be used in making various colored rubbers (other than white) without causing discoloration.

For practically every type of rubber there is a Sun processing aid that will speed up manufacture and improve quality. They do not cause surface bloom even in exacting products like chemically-blown sponge rubber, white sidewall tires and pastel-colored articles. For full information about Sun's "Job Proved" rubber processing aids, write Department RA-3

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INDUSTRIAL PRODUCTS

Announce "Ultipara" Synthetic

The development of a new synthetic rubber, called "Ultipara," was announced by the Copolymer Corporation on February 12. The organization was originally formed by eight of the smaller tire manufacturing concerns to operate a government-owned synthetic rubber plant of 30,000-ton annual capacity at Baton Rouge, La. The new synthetic rubber will be produced by the new low temperature technique. According to the announcement, the development of this technique followed the visit to Germany of one of the rubber research teams. The Federal government subsequently made grants to the University of Minnesota and the University of Illinois for research. The Phillips Petroleum Co. was also conducting research along these lines and merged its activities with those of the universities, also building a small pilot plant. Later, according to the announcement, the Copolymer Corporation took an interest in the project and developed it to the production stage. Total cost of research and development conducted under the auspices of the Office of Rubber Reserve was placed at $15,000,000. Production of low temperature polymers will be carried out by the Copolymer Corporation at Baton Rouge under the temporary designation of X-435-GR-S, and at Borger, Texas, by the U. S. Rubber Co. as X-432-GR-S.

Offer Atlas Plant for Sale

Pursuant to an order of the Court of Chancery of New Jersey, offers will be received at the Chancery Chambers, Paterson, N. J., on April 5 for the complete running plant of Atlas Rubber, Inc., 110 Delawanna Ave., Clifton, N. J. The plant consists in part of the following equipment and machinery: combining machines, spreaders, tenter frame, beamers, slitter, tubing machines, calenders, doubler, spray booth, coating head, dry cans, mill trucks, weighing scale, sewing machines, etc. All offers are subject to the Court's confirmation. Suitable arrangements may be made with the landlord for a long-term lease. Inspection of premises is invited on Mondays, Tuesdays and Wednesdays. Inquiries should be addressed to Vincent C. Duffy, Receiver of Atlas Rubber, Inc., 208 Market St., Paterson, N. J.

Lecture Booklet Available

The 1947 Edgar Marburg Lecture of the American Society for Testing Materials, entitled "Engineering Laminates" by Professor Walter C. Voss, head of the Department of Building Engineering and Construction, Massachusetts Institute of Technology, has been issued by the Society as a separate booklet, and is now available. The author presents a review of some fundamentals involved including atomic structure and bonds, chrystal latices, and plastics. This discussion of chemistry, physics and crystallography is followed by a section on adhesion, because of its importance in the field of laminates. Copies of this lecture, totalling 36 pages, can be procured from A.S.T.M. headquarters, 1916 Race St., Philadelphia 3, Penna., at $1.00 per copy.

Thompson Joins Andrews-Alderfer

Robert D. Thompson

Robert Dale Thompson, for many years associated with the Goodyear Tire & Rubber Export Co., and until recently manager of that firm's South American Division, has joined the Andrews-Alderfer Processing Co., Inc., of Akron, Ohio. Mr. Thompson is handling franchise arrangements on the new Andal rubber thread process developed by the company and now offered to the industry. The process is based on cutting uncured sheet and continuous cure on a belt, and is said to be of special interest for foreign countries because of the limited investment involved. Franchise arrangements have already been concluded with a number of domestic and foreign concerns. Mr. Thompson is currently on a six-week trip to Europe and plans an early trip to South America.

Puncture-Sealing Inner Tube

The Seiberling Rubber Co., Akron, Ohio, recently announced the reintroduction of its "sealed-air" puncture-sealing inner tube for automobiles and trucks after an absence from the market of more than six years. The tube, which utilizes a layer of soft, plastic gum held in place by strong rubber bulkheads, to seal punctures caused by nails, glass, and other road hazards, has been redesigned to eliminate excess weight, the company stated. To repair a puncture, the car owner needs only to remove the nail and the tube repairs itself as the soft gum flows into the injury. Seiberling holds patents on rubber bulkheads that holds the sealing gum in place inside the tube.

"Moisture Absorption Study of Philblack A and Philblack O with Other Commercial Blacks" is the title of the latest technical bulletin (No. 8) issued by the Philblack Division of the Phillips Petroleum Co. Results at 32%, 66% and 98% humidity are discussed.

Takes Over Weathering Unit

The National Carbon Co., has announced that the Atlas Electric Devices Co., Chicago, Ill., has taken over the manufacture and sales of the National Weathering Unit Model X1A, including repair parts, supplies and service to present users. Atlas has manufactured weathering and fading equipment including the Weather-Ometer and the Fade-Ometer as well as the Launder-Ometer for over 25 years. Atlas is now redesigning the Model X1A to incorporate the automatic cycling and other control features of the Atlas Twin-Arc Weather-Ometer but is retaining as a light source the National Sunshine carbon arc. The redesigned weathering unit will be an addition to the regular line of Atlas products.

Gravity Tandem Tire Savings

According to an announcement by the Freuhauf Trailer Co., Detroit, Mich., operators' records indicate that gravity suspension tandems are doubling and in some cases tripling tire mileage. Top mileage reported to date is 220,000 miles on one set of tires without recapping, made by a West Coast trucker. Other operators report 80,000 to 150,000 miles before recapping, as compared with 30,000 to 50,000 miles on conventional tandems. Increased tire mileage, Freuhauf officials stated, is due to the independent axle suspension which allows axles to follow curves automatically, without the usual tire scuffing, and torsion bar springing which eliminates brake chatter and wheel hop.

Pioneer Announces Promotions

Two promotions on its executive staff have been announced by the Pioneer Rubber Co., Willard, Ohio. L. F. Pagel, chief chemist of the company since 1924, has been named production superintendent, and C. R. Clark, associated with the company since 1920, is now factory general manager. Mr. Pagel will have direct charge of production in the main plant, the cloth glove plant and the Attica (Ohio) plant. Mr. Clark is in charge of all factory operations in all plants. Both men are members of the board of directors. At the same time the resignation of John Fackler was announced. Charles Baker is taking over Mr. Fackler's duties in the purchasing department.

Retires After 61 Years

An interesting ceremony took place at the Streatham Common, London, England, premises of P. B. Cow & Co., Ltd., on January 14. The concern started its activities in 1836 on the same premises. The ceremony was a dinner given by the company to mark the retirement from service of I. J. Bush, cashier, who had been continuously employed by the company for 61 years. The dinner, attended by approximately 50 employees, was confined entirely to directors, senior executives, and to employees with over 20 years of continuous service. A number of short speeches were given.

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NEW POLYMERS AUTHORIZED BY OFFICE OF RUBBER RESERVE, RECONSTRUCTION FINANCE CORPORATION

Listed below are types and properties of new experimental GR-S polymers (including GR-S latices) which have been authorized by the Office of Rubber Reserve, Reconstruction Finance Corporation, since publication of those in our previous issue. Procedures for the distribution and sale of these polymers will be found in our October, 1945, issue. Normally, experimental polymers will be produced only at the request of the consumers and 20 bales (one bale weighs approximately 75 pounds) of the original run will be set aside if possible for distribution to other interested companies for their evaluation. The 20 bales when available will be distributed in quantities of one or two bales upon request to the Sales Division of Rubber Reserve or will be held for six months after the experimental polymer was produced unless otherwise consigned before that time. Subsequent production runs will be made if sufficient requests are received to warrant them.

X Number	*Manufacturing Plant*	*Date of Authorization*	*Polymer Description*	*Special Characteristics*
X-432 GR-S	U. S. Rubber, Borger		GR-S made at lower reaction temperatures with cumene hydroperoxide activated recipe.	
X-433 GR-S	General, Baytown	1/20/48	A mixture containing 60 parts of Pelletex (SRF carbon black) and 100 parts of the same GR-S type polymer as used in GR-S-Black-1, stabilized with 1.5% Stalite.	A relatively non-staining mixture of GR-S and an SRF black in a slightly more concentrated form than other similar mixtures. Limited production in February.
X-434AC GR-S	Candian Synthetic, Sarnia, Ontario		GR-S-AC made in standard plant equipment (not pelletized before drying).	The Polymer Corporation, Ltd., Sarnia, Ontario, Canada, is scheduling this run.
X-435 GR-S	Copolymer, Baton Rouge	1/28/48	GR-S made at lower reaction temperatures (41°F) with cumene hydroperoxide activated recipe with rosin soap emulsification, 60 Mooney viscosity and salt acid coagulation.	Experimental lots consigned.
X-436 GR-S	U. S. Rubber, Naugatuck	1/27/48	Glue-acid coagulated GR-S at 105 to 125 Mooney viscosity. Otherwise similar to Standard GR-S.	Similar to X-248- GR-S except for a slightly lower Mooney viscosity range. This is a low water absorption high Mooney type. For February production.
X-437 GR-S	Goodrich, Port Neches	1/29/48	GR-S-10 at 55 to 65 Mooney and stabilized with 1.5% Santovar A.	The same as X-274 GR-S except that Santovar A is used in place of Stalite. For February production.
X-438 GR-S	Goodyear, Torrance	2/24/48	Standard GR-S at slightly lower conversion.	Scheduled for February Production.
X-439 GR-S				
X-440 GR-S				
X-441 GR-S	U. S. Rubber, Naugatuck	3/3/48	A 55 - 45 butadiene - styrene charge ratio GR-S emulsified with potassium rosin soaps at higher than normal reaction temperatures. Coagulated with alum - acid - glue mixture and stabilized with 0.5 percent Stalite. Quick Mooney range of latex to be 50 to 75.	Scheduled for March Production.
X-442 GR-S	Firestone Akron	3/1/48	GR-S-AC modified with terpene mercaptan.	Scheduled for February Production.
X-443 GR-S	Firestone, Lake Charles	3/1/48	GR-S-45AC shortstopped with hydroquinone.	Regular shortstopper causing plant equipment corrosion. X-443 GR-S being made to combat this situation. Scheduled for March Production.

Pharis Operating New Unit

With the installation of equipment in the newly reconverted and redesigned Plant No. 2 of the Pharis Tire & Rubber Co., Newark, Ohio, an entirely new bicycle tire manufacturing unit has started production. Made possible by the acquisition of additional space in an RFC building purchased by the company since the war, the new plant features simplicity in handling all components.

Wire Manual Published

A new 48-page booklet on building wire, "Hazard Building Wires," has been issued by the Hazard Insulated Wire Works Division of the Okonite Co., Passaic, N. J. The manual contains complete engineering information on the many types of wire and cable required by the building industry. A copy of the booklet, Bulletin H-408, may be obtained upon request to the company.

Hewitt to Make Mattresses

The Hewitt Restfoam Division of Hewitt-Robins, Inc., Buffalo, N.Y., has announced that it will introduce a new fully molded reversible foam rubber mattress in the near future. Made of natural latex, the mattresses will be covered with American and imported Belgian fabrics. Both twin and full sizes will be offered. A special, deep box spring will be included as a companion item.

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TECHNICAL REPORTS AVAILABLE FROM THE DEPARTMENT OF COMMERCE

Data on additional reports on industrial and technical developments which occurred throughout the world during the wartime period is listed below. This information is taken from the "Bibliography of Scientific and Industrial Reports," issued by the U. S. Department of Commerce, and copies of the reports listed may be secured, at the prices indicated, from the Office of Technical Services, Department of Commerce, Washington 25, D. C. Remittances made payable to the Treasurer of the United States must accompany order. Titles of the more recent reports follow:

Effects of Oils on Volume Change of Synthetic Rubbers. By P. J. Mahoney. Test results on volume swell of compounds of neoprene, Perbunan, Hycar, and Chemigum upon immersion in A. S. T. M. oil and aircraft engine lubricating oil.—Report No. PB 16288. 5 pp. Photostat, $1; Microfilm, 50c.

Properties of the Synthetic Rubbers. By P. J. Mahoney and others. Synthetic rubbers are classified according to chemical composition and results of tests conducted on original physical properties, effects of immersion in fuels and oils, and effects of high and sub-zero temperatures are presented.—Report No. PB 16847. 24 pp. Photostat, $2; Microfilm, 50c.

Production of Acrylonitrile at Leverkusen Plant of I. G. Farbenindustrie. By A. Cambron. Supplements previous information on the production of acrylonitrile from acetylene and hydrocyanic acid. —Report No. PB 19678. 10 pp. Photostat, $1; Microfilm, 50c.

Gummiwaren Fabrik Phoenix, Harburg, Hamburg. By Glen Gay. Manufacture of rubber footwear from Buna S, SS and S3 at this plant described.—Report No. PB 20088. 30 pp. Photostat, $1; Microfilm, 50c.

Properties and Analysis of German D-52 Latex. By S. H. Maron and others. Report 29 from the Case School of Applied Sciences.—Report No. PB 13360. 8 pp. Photostat, $1; Microfilm, 50c.

General Summary of Production and Use of Reclaimed Rubber in Germany. Issued by the Office of Rubber Reserve.—Report No. PB 13337. 14 pp. Photostat, $1; Microfilm, 50c.

Summary Report: German Synthetic Insulation for Wire and Cable. Issued by the Office of Rubber Reserve.—Report No. PB 13339. 28 pp. Photostat, $2; Microfilm, 50c.

Summary Report on the Production and Performance of German Synthetic Tires and Other Transportation Items. Issued by the Office of Rubber Reserve. Based on inspection of Continental Gummiwerke A. G. (Hanover), Harburger Gummiwaren Fabrik Phoenix A. G. (Harburg), and Deutsche Dunlop Gummi Compagnie A. G. (Hanau).—Report No. PB 13336. 89 pp. Photostat, $6; Microfilm, $1.

High Grade Vulcanizable Rubber Substitute. In German. Correspondence by I. G. Farbenindustrie with respect to a patent application for products which are obtained in the emulsion polymerization of butadiene, then purified by extraction or re-precipitation, and blended with non-volatile organic compounds or their mixtures. Enlargement print of part of Microfilm.—Report No. PB 16372. 20 pp. Photostat, $2; Microfilm, 50c.

Method of Concentration. In German. Patent Application by I. G. Farbenindustrie on March 4, 1937, for method of concentration of emulsions of butadiene polymers which contain alkyl naphthalene sulfonic acids and cannot, or can only with difficulty, be concentrated by mechanical operations. Enlargement print of part of Microfilm 182-4.—Report No. PB 16385. 2 pp. Photostat, $1; Microfilm, 50c.

Perduren G: Composition of the Mixture and Instructions for Manufacture. This material has been used by I. G. Farbenindustrie to produce rubber goods which withstand swelling. Enlargement print of part of Microfilm 180-2.—Report No. PB 17347. 23 pp. Photostat, $2; Microfilm, 50c.

Physical Significance of the Figures Stated in Testing Rubber. In German. Leaflet of the division for the testing of Buna rubber for I. G. Farbenindustrie which explains the symbols, terms, methods, and machinery used in the examination of the raw materials, mixtures, and vulcanizates, which go into the manufacture of synthetic rubber. Enlargement print of part of Microfilm 182-5.—Report No. PB 16338. 5 pp. Photostat, $1; Microfilm, 50c.

Method for Production of Rubber-Like Compositions. In German. Rough draft of a patent application by I. G. Farbenindustrie for second phase of process of intended patent application covered in PB 16386, in which the use of dichlorobutylene instead of 1,3-butadiene was described. Enlargement print of part of Microfilm 182-6.—Report No. PB 16384. 5 pp. Photostat, $1; Microfilm, 50c.

Physical Data for Isoprene. Data is derived from letters written by Prof. W. Roth to the Ammonia Laboratory of I. G. Farbenindustrie, in which the heat of combustion and the heat of evaporation are given. Enlargement print of part of Microfilm 180-2.—Report No. PB 16384. 5 pp. Photostat, $1; Microfilm, 50c.

On the Disactivating Effect of Oxygen in the Emulsion Polymerization of Vinyl Compounds—List of Patents. In German. Enlargement print of part of Microfilm 182-5.—Report No. PB 16332. 4 pp. Photostat, $1; Microfilm, 50c.

Method for Production of Rubber-Like Polymerization Products. In German. Correspondence regarding a patent addition to the main patent by I. G. Farbenindustrie for the polymerization of vinylcarbazole in the presence of polymeric isobutylene. Enlargement print of part of Microfilm 182-6.—Report No. PB 16378. Photostat, $1; Microfilm, 50c.

Water Soluble Oils Available

A recent development that has been translated to commercial production now makes available in commercial quantities a number of chemical esters, of an oily character, that dissolve clearly in water. Produced and sold under the name of Polyethylene Glycol Mono Oleates (S1005) and (S1010) and Polyethylene Glycol Mono Laurate (S1019), these esters are available from the Glyco Products Co., Inc., Brooklyn, New York. The esters have a molecular weight above 800, are non-ionic, non-toxic, light in color and fluid or grease-like in consistency. They dissolve clearly in water, alcohol, esters, hydrocarbons and vegetable oils, the manufacturer states. At 20° C. they are slightly heavier than water. They all have high boiling points and exhibit surface active properties. Their use as special detergents, as penetrating lubricants, and as plasticizers for water dispersed products and water-insoluble resins, elastomers, plastics, coatings, etc., is indicated.

Hot Material Conveyor Belt

Development of a hot material conveyor belt using glass fabric instead of the cotton fabric used in the conventional belt made for this service has been announced by the B. F. Goodrich Co., Akron, Ohio. The company suggests for this use two weights, a four-ply for light service and a five-ply for wider-longer belts where working stresses will be somewhat higher than that in light service. The tensile strength of each ply of glass is said to be approximately equal to the standard 32-ounce cotton fabric normally used. Advantage of glass fabric for this service, the company says, is its resistance to loss of carcass strength under high temperatures.

Manufacture of Vinyl Ethers

The technique and equipment used for the manufacture of lower vinyl ethers by pressure reacting acetylene and the lower boiling aliphatic alcohols with a catalyst consisting of the potassium alcoholate of the respective alcohols are described in a report (PB-97606) issued by the Office of Technical Services, Department of Commerce. Two separate steps are covered, the first on the manufacture of the so-called "distilled" vinyl ethers containing 90 to 95% vinyl ethers and 5 to 10% of alcohol, and the second on the production of "distilled" vinyl ethers of suitable purity for polymerization.

Report on Butynediol Available

Details of a continuous process for the manufacture of butynediol and butanediol, as well as of laboratory work on butenediol and propargyl alcohol in Germany, are contained in a new report (PB-80334) made available by the Office of Technical Services, Department of Commerce. The report is based mainly on the butynediol and butanediol processes in operation, on a plant scale, at the I. G. Farbenindustrie plant at Ludwigshafen.

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LOS ANGELES NEWS

The March meeting of the Los Angeles Rubber Group, held on March 2, again high-lighted an informative and interesting lecture and discussion before the Technical Group Section. Mr. Robert A. Lees (American Anode) spoke on "The History and Processing of Latex."

The Group members were reminded of an interesting point in regard to liquid latex, namely that as a manufacturing raw material it dates back 160 years. The commercial development of this commodity, however, was blocked by the perishable nature of latex and the high cost of transporting low rubber-content latex. When the use of ammonia preservation and the introduction of procedures for concentrating latex were adopted, the consumption of liquid latex increased rapidly and steadily from 1922 until 1942, when latex consumption was placed under the regulation of the Federal Government.

The lifting of government restrictions in late 1947 resulted in renewed interest on the part of the manufacturers and there are indications today that consumption figures will soon reach twice the pre-war level.

Mr. Lees discussed the most important methods of producing concentrated latex and the advantages of the resultant products. He also enumerated the various testing methods and instruments for determining the solids content, alkalinity, stability and viscosity of latex and latex compounds. The analysis of the chemical and physical characteristics of latex led up to an explanation of the art of latex compounding and the use of latex in the factory. To illustrate his talk, Mr. Lees displayed samples of natural rubber latex and several types of synthetic latex, and examples of typical pigment dispersions.

Mr. Lees concluded his talk with a listing of some of the numerous products in which latex is used, and he confidently predicted an expanding market as more uses for the product are developed.

George W. Miller (Voit Rubber) Technical Group Chairman, acted as moderator during the talk and thanked Mr. Lees for the Rubber Group.

The after-dinner program included the regular business meeting, followed by an address by Mr. Jacob Chaitkin, Russian Language instructor at the California Institute of Technology. Mr. Chaitkin's experience with the U. S. Air Force Intelligence, and his work as interpreter to Soviet military missions, qualified his facts in "Facts and Fancies in the Cold War."

Phil Drew (Goodyear), Chairman of the Rubber Group, was responsible for getting together one of the most successful meetings the Group has had.

George R. Steinbach recently announced the acquisition of his interest in the Atlas Sponge Rubber Co. by Roy N. Phelan, formerly Division Manager of the McGraw-Hill Publishing Co., Inc., Los Angeles. Mr. Phelan has been associated with the latter firm on the Pacific Coast for the past 23 years, and is well known in industrial sales and advertising circles.

Mr. Steinbach will continue his association with the Atlas company for awhile. It was also announced that Walter R. Westman will continue as plant superintendent, along with no change in technical or production personnel.

Charles A. Lamb (Lamb Rubber) announced the manufacturing of golf bals as an added product to their regular lines of oil field supplies, sporting goods and rubber adhesives. Harold Rowntree, formerly purchasing agent for Joshua Handy Co., is now acting as a sales representative for the Lamp Corporation.

The Los Angeles Rubber Group is proud to announce the formation of their Birmingham Hospital Veterans' Project. A committee has been formed to effect the following goals: (1) To teach convalescents the art of manufacturing rubber parts and other items needed in treatment of the wounded veterans as part of their rehabilitation program; and (2) To produce rubber parts better adapted to the treatment of wounded veterans, than are now available.

The Veterans' Project Committee is composed of: V. S. Anderson (Pacific Rubber) Chairman, R. E. Hutchinson (Firestone), W. J. Haney (Kirkhill), Jack Knudsen (Kirkhill), R. Stringfield (Fullerton), I. W. Roberston (Latex), C. R. Wolter (Witco), Ralph Brown (Brown-Muth), Louis Warner (Firestone) and Phil Drew (Goodyear).

L. F. Hartung, formerly with Rubber Reserve, has been appointed production manager of the Reeves Rubber Co., San Clemente, Calif.

Del Driesbaugh has been transferred to the sales department of the Kirkhill Rubber co.

Group members felt a personal loss after the death of James D. Fitzharris (Firestone). In point of service, Mr. Fitzharris was the oldest member of the Firestone organization on the West Coast.

Arthur E. Grundy (Goodyear) has been appointed West Coast District Manager for Pliofilm Sales. The appointment was announced by C. P. Joslyn.

The Dewey and Almy Chemical Co., which maintains headquarters in Cambridge, Mass., has moved its California plant from Oakland to 2140 Davis St., San Leandro, Calif. The former plant in Oakland is being completely dismantled.

A bright year for the Los Angeles rubber industry was recently predicted by D. W. Walsh, Pacific Coast sales manager of the U. S. Rubber Co., in a statement made to industrial leaders. National sales volume will reach a total of $2,500,000,000 this year, he stated, which is more than two and a half times the volume of 1940, the prewar record year, but somewhat below the $2,700,000,000 recorded in 1947.

Pointing out that consumption of natural rubber in 1947 exceeded synthetic rubber consumption for the first time since 1943, Mr. Walsh said that the return to natural rubber will be further advanced in 1948. He estimated total consumption in 1948 will reach 905,000 long tons, of which 550,000 tons will be natural rubber and 355,000 tons synthetic rubber.

The Los Angeles rubber industry will contribute substantially to the national total, according to Mr. Walsh, since expansion of production capacities and markets has placed the city in second place in production. The tire industry of the city has reached a capacity of 44,000 casings per day, he said, which represents an increase of almost 100% over prewar capacity.

A kit of Pliofilm packaging materials, designed for home freezer use, has been introduced by the Goodyear Tire & Rubber Company and Western Products, Inc.

The kit consists of 24 pint and 24 quart cardboard cartons and Pliofilm bags, a household roll of Pliofilm 18-inches wide and 65 feet in length, six poultry bags, one roll of stockinette material, adhesive tape, two cardboard carton fillers, and an instruction booklet on the proper use of Pliofilm.

The kit will be available through appliance dealers, department stores and locker plants.

The Slusser Trophy for the best 1947 safety record among worldwide plants of the Goodyear Tire & Rubber Co. will be awarded to the Torrance, Calif., synthetic rubber plant, it has been announced by J. T. Kidney, safety director. 307 employees worked a total of 534,000 man-hours during last year without a lost-time accident, for a perfect record.

Threaten Civil Penalties

The Federal Trade Commission notified the "Big Four" tire companies on February 26 to supply information on their sales and prices within 30 days or face possible civil penalties. The Commission had ordered the companies—U. S. Rubber, Goodyear, Goodrich and Firestone—to furnish the information by February 24 as part of its investigation of possible anti-trust violations in giving special discounts to large-volume purchasers. The companies had requested more time in which to file the information, but instead the FTC served its "notice of default." Under the law, unless companies supply requested information within 30 days they become subject to civil penalties of $100 for each day in which they are in default.

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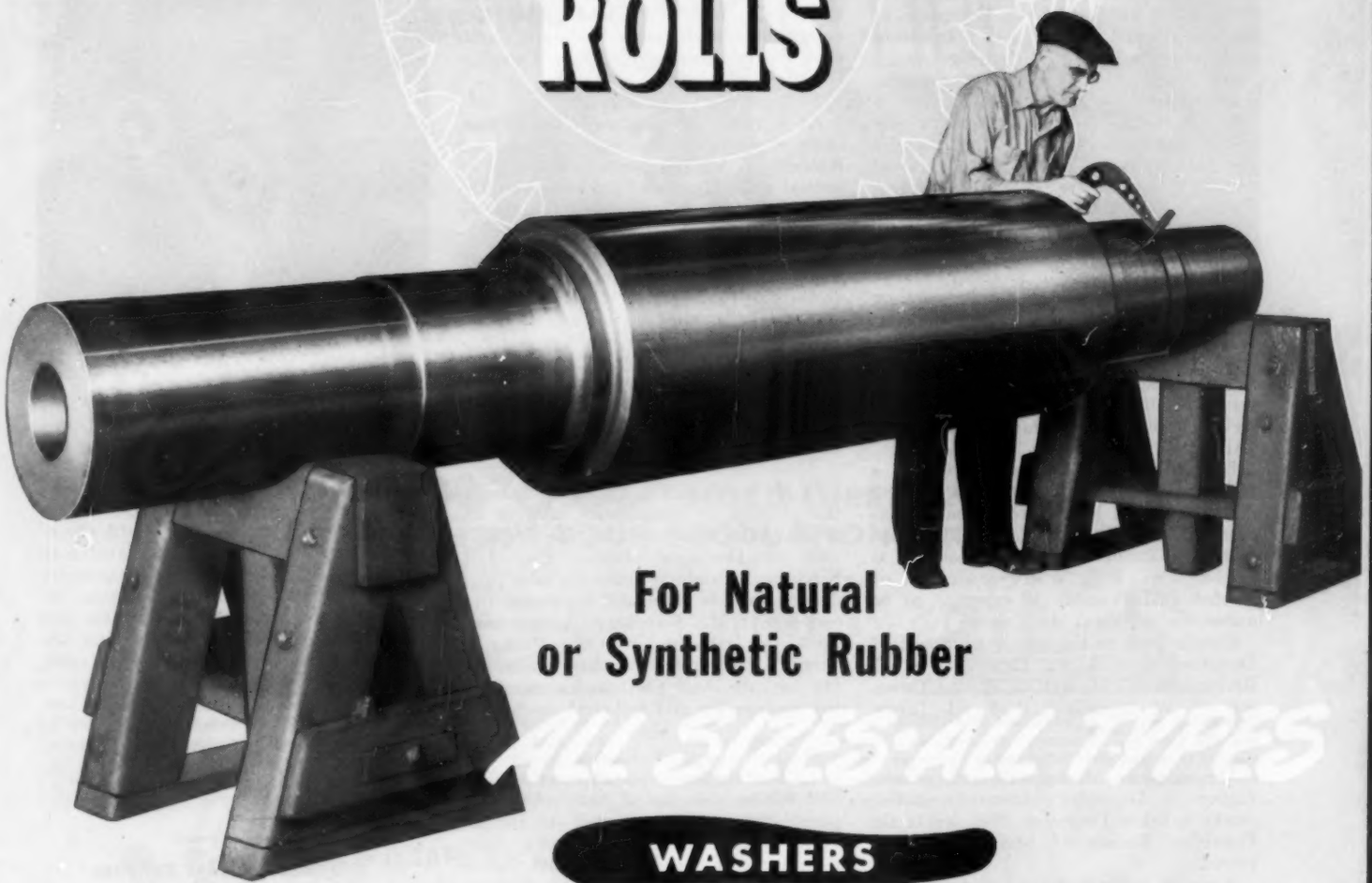
Rubber Processing
ROLLS



For Natural or Synthetic Rubber

ALL SIZES-ALL TYPES

WASHERS

CRACKERS

REFINERS

MILLS

CALENDERS

Whether you need rolls for renewals in present equipment, or specially designed rolls for radically new processing requirements, consult UNITED engineers. The advantages of their metallurgical and technological research, obtained through more than 30 years experience in design and manufacture of rolls for the rubber industry, are at your service.

UNITED ENGINEERING AND FOUNDRY COMPANY

Plants at PITTSBURGH, VANDERGRIFT, NEW CASTLE, YOUNGSTOWN, CANTON

Subsidiary: Adamson United Company, Akron, Ohio

Affiliates: Davy and United Engineering Company, Ltd., Sheffield, England
Dominion Engineering Works, Ltd., Montreal, P. Q., Canada
S.E.C.I.M., Paris, France

REG. T.M.

CANADIAN NEWS

Heavy capital expenditures for expansion and modernization of production facilities featured the 1947 operations of the Goodyear Tire & Rubber Company of Canada, Limited, according to a statement made recently by A. G. Partridge, president, at the annual meeting of company shareholders.

Mr. Partridge declared that for the year ending December 31, 1947, the company and its subsidiaries showed a net profit of $3,931,248. After deducting a non-operating gain of $308,904 and providing for the full dividend on preferred shares, this figure amounts to the equivalent of $12.83 per share of common stock outstanding.

A net total of $3,154,836 was spent on buildings and equipment during the year. This sum was obtained from profits and from the sale of $2,500,000 worth of preferred stock and was used, in part, for the completion of two new factories at New Toronto which are now producing "Airfoam" and "Pliofilm."

During 1947, the company also spent a considerable sum to modernize and expand the tire plant at New Toronto and the industrial rubber goods factory at Bowmanville. A factory was also acquired at Quebec City, P.Q., where production of molded rubber goods is expected to be under way within a short time.

Unanimously re-elected to the Board of Directors were A. G. Partridge, R. C. Berkinshaw, C. H. Carlisle, P. A. Thomson, P. W. Litchfield, P. E. H. Leroy, and E. J. Thomas.

Consumption of natural and reclaim rubber in December increased, sending stocks to below December, 1946, levels, the Dominion Bureau of Statistics has reported.

Natural rubber consumption rose to 3,314 tons from 1,850 in December, 1946, while stocks totalled 5,264 tons against 5,885 a year ago. Reclaim rubber consumption increased to 1,314 tons from 1,292, dropping stocks to 2,282 compared with 3,455 a year ago.

Synthetic rubber consumption decreased to 1,980 from 2,768, but stocks were down to 4,200 from 4,565. Domestic production of synthetic rubber in December dropped to 3,064 from 4,786 a year ago and reclaim rubber production increased to 397 tons from 356.

Shareholders of the Dunlop Tire and Rubber Goods Co., Ltd., Toronto, were to be asked at the annual general meeting held on March 11 to approve the termination of the agreement which has been in effect since 1932 between the company and Canadian Industries, Limited, under which Canadian Industries, Limited, has been providing certain managerial services. G. W. Huggett, H. Greville-Smith, and T. W. Smith, officials of Canadian Industries, Limited, have expressed their willingness to continue as directors for the time being and their experience and judgment will be most beneficial to Dunlop during the transitional period. Dunlop Rubber Co., Ltd., of England, recently acquired the minority stock holding in Canadian Dunlop formerly held by Canadian Industries, Limited.

As a result of a job evaluation plan, office employees of the Gutta Percha and Rubber Co. will receive pay increases of several dollars a week, retroactive to December 1st, it was announced recently by the United Office and Professional Workers, CIO.

The union and the company have been carrying out the job evaluation as a joint project, the announcement said. The union had asked for an immediate "payment on account" of $5 a week. The company countered with an offer of $7.50 a month. Later, following meetings with a department of labor concilliator, a satisfactory compromise was worked out.

G. M. Stambaugh has been appointed to take charge of commercial sales in the general sales department of the tire division of Dominion Rubber Co., Ltd., Kitchener. Products under his sales jurisdiction include farm and implement tires and tubes. Mr. Stambaugh's appointment marks his transfer from the Provincial Tire Co., where he was sales supervisor. He has also had previous experience in tire engineering and technical services.

Dunlop Tire and Rubber Goods Co., Ltd., Toronto, has reported a net profit of $388,497 for the year of 1947, which compares witth $442,940 reported for the previous year. The 1947 profit was determined after provision of $307,348 for depreciation and $307,000 for taxes. The consolidated balance sheet as of December 31, 1947, reveals current assets of $4,586,243, including $182,488 in cash, $99,901 in government securities, $1,065,882 in accounts receivable, and $3,237,972 in inventories. Current liabilities are listed at $1,245,162, including $1,033,959 in accounts payable and $211,203 in accrued taxes.

John W. Bruce, O.B.E., of Richmond Hill, Ontario, one of the best known trade unionists in Canada, has been appointed a director of the Polymer Corporation as labor representative. Mr. Bruce is at present the International Officer of the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada.

A new type of sponge rubber standing mat for bank and hotel clerks, cashiers and machine operators, and others whose work requires constant standing, has been introduced by Goodrich. It is ⅜-inch thick, 20 inches long, 18 inches wide, and weighs 3½ pounds.

Griffin Joins Harwick Sales

George E. Griffin

The Harwick Standard Chemical Co., Akron, Ohio, has announced the appointment of George E. Griffin to the sales staff of the Akron general offices. Mr. Griffin is a graduate of Akron University, where he received his basic rubber chemistry training, and also of the Cleveland, Ohio, Law School. Associated with the B. F. Goodrich Co. as a compounder in the Industrial Products Division for over 20 years, Mr. Griffin, during the past year, was Development Manager of the Shoe Products Division at the Clarksville, Tenn., plant. During the war he was a member of the Consulting Technical Committee of the War Production Board on soles and heels and industrial products. He is a member of the American Chemical Society, as well as a member of the Ohio State Bar.

Additional Indonex Bulletins

The Chemical Products Department, Standard Oil Co. (Indiana), 910 So. Michigan Ave., Chicago 80, Ill., has made three new bulletins available on its Indonex plasticizers. These are: (1) Masterbatch Addition of Indonex Plasticizers to Natural Rubber Compounds; (2) Indonex Plasticizers with Various Fillers in Reclaim Stocks; (3) Selection of Indonex Plasticizer-Accelerator Combinations. Copies of these bulletins can be secured from the company on request.

Booklets on Rubber Machinery

The Adamson United Co., 730 Carroll St., Akron, Ohio, is currently offering three new booklets on some of its rubber machinery and equipment. One of the booklets is devoted to illustrations and descriptions of the company's vulcanizers and autoclaves (Catalog No. 461), another to hydraulic presses (Catalog No. 462), and the third to mills, refiners, crackers and washers (Catalog No. 463). Copies of any of these booklets can be secured on request direct to the company.

Rubber-Flo IS THE ANSWER

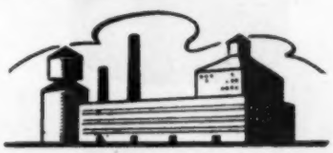
FOR KEEPING MOLDS CLEAN...

Rubber-Flo MOLD LUBRICANT WILL HELP YOU "LICK" YOUR PRODUCTION PROBLEMS

PLANT "A"

Plant "A" manufactures mechanical rubber goods. Production is unsteady . . . maintenance costs are high. Factory records show that several times a month, sometimes once a week, the molds are shut down and allowed to cool so that they can be cleaned. Plant "A" is losing production because an ordinary mold lubricant won't keep the molds clean.

PLANT "B"



Plant "B" manufactures rubber soles and heels as well as mechanical rubber goods. Their production, too, was uneven . . . showed ups and downs . . . until a chemist suggested **RUBBER-FLO** Mold Lubricant to keep the molds clean. Now, after a full year's operation, the molds are still clean, *with not a single shut-down!*

- *Rubber-Flo* is SAFE! It is a non-toxic, odorless mold lubricant.
- *Rubber-Flo* is QUICK! It may be sprayed, brushed or dripped onto the mold. It will not clog a spray gun.
- *Rubber-Flo* is ECONOMICAL! The savings in maintenance more than pays for it.
- *Rubber-Flo* is LOW IN COST! It comes in concentrated form and is diluted with water for use.

For softening synthetic and natural rubber use *RUBBER-SOL*

RUBBER-SOL is a safe, non-toxic, non-explosive liquid.

RUBBER-SOL removes rubber, gum, varnish, paint and carbon from metal without any harm to the metallic surface.

PREVENTIVE MAINTENANCE COMPANY

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Mail this coupon today for a free sample and further information

Name

Address

Without obligation to me, please send further information and samples of

Rubber-Flo

○ ○ **RUBBER-SOL**

NEW RUBBER GOODS

Safety Bottle Carrier

A new molded rubber bottle carrier has been announced by the Fisher Scientific Company, Pittsburgh, Pa. The carrier was designed to make unnecessary the carrying of corrosive acids or other danger-

ous agents without adequate protection. The carrier is molded in one piece of Perbunan, and will hold the standard five pine size laboratory acid and alkali bottles. A special circular ridge has been molded on the bottom of the unit so that bottles will always be centered. The handle has been molded with the carrier and not cemented on.

Safety Vacuum Lifter

The Industrial Products Company, 2803 N. Fourth St., Philadelphia 33, Penna., has announced a new vacuum lifter designed for lifting, feeding and positioning sheets of metal and other materials in stamping

machines and die presses. The over-all length of the lifter is 15 inches; height at cup end 1½ inches. The lifter, which weighs 4½ oz., may be used with equal success on metal or other non-porous materials, as well as on blanks of curved contour, fibre, tinplate, plastic, linoleum, tile glass and other rigid materials.

Flexible Duct Connectors

The Acme Steel Co., Chicago, Ill., has successfully employed Fiberglas-backed industrial adhesive tapes and rubber-coated Fiberglas fabric to replace other materials which proved unable to stand up for more than short periods, or which for other reasons proved less than satisfactory. At the company's steel plant in Riverdale, Ill., blowers connected with large stacks, 24 inches in diameter and 20 feet high, carry off sulfuric acid fumes from vats used for pickling sheet steel. The regular flexible duct connectors regularly rotted out in less than three months. The new type of adhesive tapes are manufactured by Bauer and Black, Chicago.

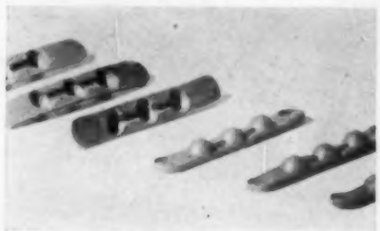
Mayfair Play-a-Puppets

A line of attractive toy animals, cleverly assembled to permit puppet operation, is currently being featured by Mayfair Plastics, Inc., 444 Madison Ave., New York 22, N. Y. Called Play-a-Puppets, the new novelties, which include a horse, a pony

and an elephant, are made from Geon plastic, and come in a variety of bright colors. Each is equipped with a jingle bell to increase the interest of the child, and the legs are easily manipulated by means of string. The Play-a-Puppets are readily washed with soap and water.

No-Noiz Rubber Silencers

The Marin Manufacturing Co., 357 No. Beverly Drive, Beverly Hills, Calif., has introduced a new line of rubber silencers for doors and windows. They may also be attached under toilet seats, Called No-Noiz Rubber Silencers, they are de-



signed to effectively eliminate all noises, including slams and rattles. Pneumatic cushions on the silencers take the force of the shutting or opening. The silencers are mounted six on a card with full instructions for use furnished.

Galloper Basketball Shoe

The Tyer Rubber Co., Andover, Mass., has announced the addition of the Youth's Galloper to its line of Tyer Sportz moulded sole shoes. Specially built for basketball and other fast footwork games, the new shoe features army duck uppers, large rust proof eyelets, tubular laces, outside webbing backstay ankle guard, contrasting two color foxing, heavy duck insoles with cushion heel, non-marking moulded outsole, extra-wide white toe guard and an outside ribbed rubber toe cap.

Junior Steering Wheel

A realistic reproduction of a real automobile steering wheel, made of indestructible rubber, has been placed upon the market by the Statler Manufacturing Co., 444 West Superior Street, Chicago 10, Illinois. The toy, when attached to the dash by a non-scratching suction-cup, permits a youngster to "drive" along, making "right" and "left" turns. A further lifelike touch is supplied by a horn that gives off realistic sounds, but softly, so as not to annoy the driver.

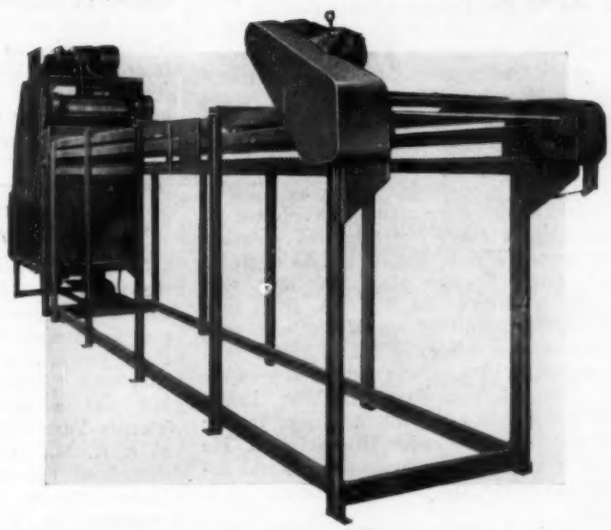
Cut your Banbury Cycle Time...

with this

AKRON-STANDARD AUTOMATIC MILL BATCH-OFF MACHINE

MILL END. *The Akron-Standard automatic batch-off machine ready to receive milled stock.*

Designed primarily to handle the mill output in connection with Banbury dump mills, this proven Akron-Standard machine distinctly shortens your Banbury cycle. It saves valuable mixing time by removing a continuous slab of stock from the mill in two minutes or less—*in a mere fraction of the time* you have heretofore needed to slab off the processed stock by hand. Your processing cycle is reduced, your stock-handling definitely speeded up. How can you possibly afford to be without this remarkable time-saving Akron-Standard equipment?



BATCH-OFF END. *Rack loading end and festoon rack in position to receive milled slab.*

Ask for our well illustrated 36-page Bulletin "A", describing this and many other types of profit-making Akron-Standard equipment.

The Akron Standard Mold Co.

1624 Englewood Avenue *"The Established Measure of Value"* **Akron 5, Ohio, U. S. A.**

OBITUARIES

Arthur E. Barnard

Dr. Arthur E. Barnard, inventor's counsel for the U. S. Rubber Co., died at his home in Manhasset, L. I., N. Y., on February 23, of a heart attack. He was 54 years old. Born in Dedham, Mass., Dr. Barnard attended Brown University, where he was graduated in 1915. Three years later the University awarded him the degree of doctor of philosophy. Dr. Barnard had been associated with the U. S. Rubber Co. for 26 years as a biochemical adviser in the development and research of rubber and rubber products. He was stationed at the company's plant in Naugatuck, Conn., until 1939, when he joined the new products division in New York City. In 1944 he became patent and licensing specialist in the Naugatuck Chemical division's New York Office. He undertook his most recent duties as inventor's counsellor in the research and development division last November. Dr. Barnard was a member of the American Chemical Society and Sigma Psi, scientific fraternity. His wife and two sons survive.

Hopewell L. Rogers

Hopewell L. Rogers, chairman of the board of the Belden Manufacturing Co., Chicago, Ill., and former president of the American Newspaper Publishers Association, died of a heart attack on February 27, at Pompano, Fla. He was 71 years old. Born in Chicago, Mr. Rogers was educated at the Sheffield Scientific School of Yale University, and the John Marshall Law School. He began as a bookkeeper in the Advertising Department of the *Chicago Daily News* in 1897. During his career, Mr. Rogers helped to organize the Audit Bureau of Circulations, and served as director of A.N.P.A. from 1912 to 1922. From 1932 to 1935 he was with the executive offices of the Hearst Newspapers. In 1943 he was industrial member of the Chicago Regional War Labor Board. Mr. Rogers was a former trustee of the Chicago Academy of Sciences. He was a member of many scientific and social societies. He leaves a widow.

M. Vincent O'Shea

M. Vincent O'Shea, from 1929 to 1939 executive vice-president of the O'Sullivan Rubber Co., and more recently administrative vice-president of Merck & Co., Rahway, N. J., died on February 5, at the Columbia Presbyterian Medical Center in New York City. He was 49 years old. Mr. O'Shea was at one time an instructor in chemistry at Harvard University. During the war he served as a Lt. Colonel with the Signal Corps, acting as director of procurement and having charge of plants having labor and production difficulties.

Alfred P. Henry

Alfred P. Henry, assistant purchasing agent of the United States Rubber Co., died suddenly on February 5 of a heart attack in Pennsylvania Station, New York City. He was 58 years old. Born in New York City, Mr. Henry had been assistant purchasing agent of the United States Rubber Co. since April, 1934. At the time of his death, he was in charge of buying all printing and advertising material, stationery, office supplies and office equipment for the company. He was first employed by the company about 31 years ago, starting as assistant to the manager of the stationery department. Mr. Henry was a Blue Lodge Mason, member of Howard Lodge No. 35, New York City. His wife survives.

Frank E. Grider

Frank E. Grider, personnel director of the Pharis Tire & Rubber Co., Newark, Ohio, died in Newark Hospital on January 28. He had been admitted to the hospital three weeks earlier for diagnosis and treatment of a heart ailment. He was 42 years old. Mr. Grider had been associated with Pharis for more than two years, coming to Newark from Cleveland, Ohio, where he served during the war as chief of the labor division of the War Production Board in the Cleveland area, which included Newark. In Newark he was active in the Foremen's Club. His wife and two daughters survive.

Chester R. Marshall

Chester R. Marshall, associated with the Firestone Tire and Rubber Co. for the past 29 years, and a member of the company's research laboratory for the past three years, died on February 22 in the Cleveland Clinic. He was 57 years old. He was a member of the Firestone Twenty-Year Club, and Star Lodge 187, F. & A. M. Funeral services were conducted on February 25 at the McGowan Funeral Home in Cuyahoga Falls, with interment in Oakwood Cemetery. His wife survives.

Reginald V. Woffindin

Reginald Victor Woffindin, vice-president and general manager of A. G. Spalding & Bros. of Canada, Ltd., died in a hospital in Brantford, Ontario, Canada, on February 20. Born in Toronto, Mr. Woffindin had lived in both Chicago and New York. He joined the Spalding organization as a junior clerk and was appointed general manager of the Canadian organization in 1919, after overseas service with the Royal Canadian Artillery.

Keach Rubber Co. Formed

A new firm, the Keach Rubber Co., formed for the manufacture of molded rubber products for the toy, general and electrical industries, will soon start operating in Wellston, Ohio. J. R. Keach, now general manager of the Firestone Industrial Products Co., of Akron, Ohio, heads the new company. Sales offices of the concern will be located in Cleveland, Ohio, where Mr. Keach has an organization now operating as the Keach-Johnson Co., engaged in marketing rubber and plastic products. Mr. Keach will retain his present connections in Akron, and associates will manage the Wellston plant.

Report on New Brake Method

The opening session of the first postwar National Passenger Car and Production Meeting of the Society of Automotive Engineers, which was held on March 3 to 5 at the Hotel Book-Cadillac in Detroit, Mich., was devoted to a discussion of brakes. W. R. Rodgers and J. V. Hendrick, of the Chrysler Corporation, reported on new production methods for bonding brake lining to shoes with a synthetic resin-synthetic rubber compound, developments designed to increase lining life and to eliminate rivets. The title of their report was "Bonding Brake Lining to Shoes."

Installs Electron Microscope

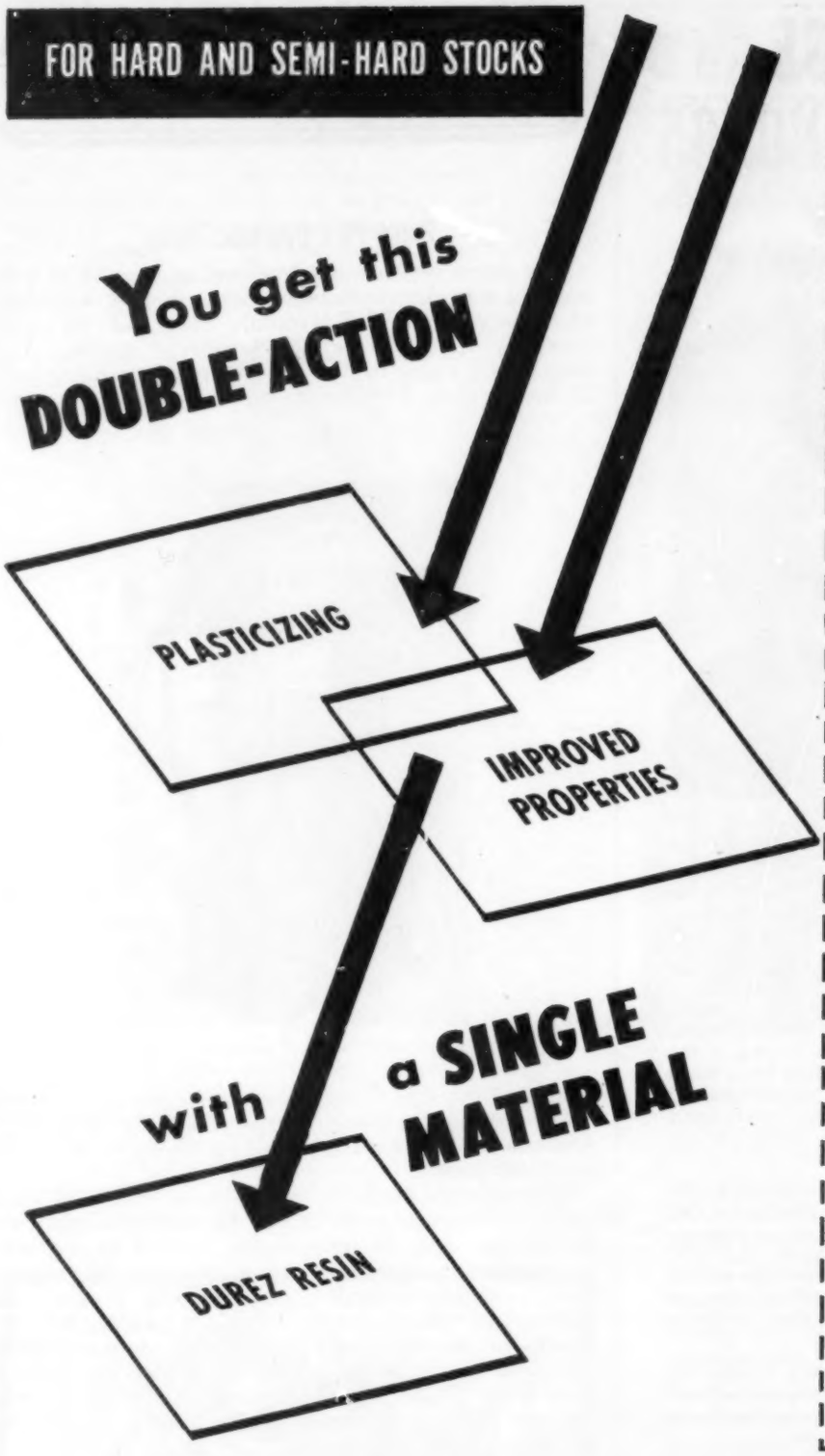
Godfrey L. Cabot, Inc., of Boston, Mass., has installed the universal model of the RCA electron microscope in its Boston laboratories for increased service to the rubber, paint, ink and other industries using Cabot carbon black. The electron microscope in the Cabot laboratories is operated under the direction of C. A. Stokes, director of research and development, and Dr. W. R. Smith, chief chemist of the company. The Cabot electron microscope is the latest to be developed by RCA. It was installed under the direction of Dr. Smith.

Offer Rubber Lining Service

The Acme-Fisher Tank Lining Co., Louisville, Kentucky, a wholly-owned subsidiary of the Broadway Rubber Manufacturing Co., is prepared to rubber line steel tanks for most corrosive factors, the work being done either in the company's shops or in the field. The company is licensed by Goodrich to install Koroseal sheet. A large job was recently accomplished for the *Louisville Courier-Journal* in connection with its new $5,000,000 newspaper plant. The Acme-Fisher concern lined 35 rotogravure tanks in the new plant.

An eight-page color booklet describing the economic and versatile performance of the new line of Westinghouse Axiflo fans suitable for high temperature applications has been issued by the Westinghouse Electric Corp., Pittsburgh 30, Penna. Copies are available on request to the company.

FOR HARD AND SEMI-HARD STOCKS



Extraordinary, but true. Specially developed Durez phenolic resins have the two-fold action of a plasticizer and a reinforcing agent. With Buna-N and GR-S rubbers, the advantage of Durez resins has been so clearly demonstrated that they are now in use for commercial runs. Easier processing, high loading, and excellent extrusions, with thermosetting properties resulting in improved product characteristics, are reasons for investigating Durez resins now. Write for "Durez Resins in the Rubber Industry." Durez Plastics & Chemicals, Inc., 313 Walck Rd., N. Tonawanda, N.Y.

12687

Durez Powdered Phenolic Resin . . . for

BUNA-N

Completely compatible

Processes readily in regular equipment

Produces good flow, easy molding, fast cures

Improves tensile strength, elongation, hardness, surface finish

Gives high abrasion, solvent, and oil resistance

13355

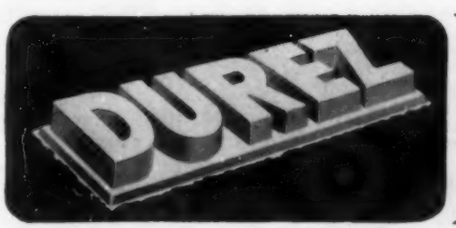
Durez Powdered Phenolic Resin . . . for

GR-S

Plasticizing action simplifies processing

Increases—hardness
—toughness
—abrasion
—heat resistance

Improves surface finish of cured stocks



PHENOLIC RESINS

MOLDING COMPOUNDS

INDUSTRIAL RESINS

PROTECTIVE COATING RESINS

PHENOLIC RESINS THAT FIT THE JOB

DC MOLD RELEASE EMULSION NO. 35

increases sales by improving appearance

PHOTO COURTESY BALDWIN RUBBER CO.

Rubber bicycle seats molded around metal inserts in a 12 cavity mold lubricated with DC Mold Release Emulsion No. 35 are easily unloaded from cavities that stay clean. The finished product therefore has a clean, bright polished surface and greater sales appeal.

Offer your customers more for their money and the sales are yours. An easy way to do this is to give rubber moldings a better and more salable appearance.

You can give your products added sales appeal by using Dow Corning Mold Release Emulsion No. 35 in molding rubber goods. Baldwin Rubber Company of Pontiac, Michigan and most of the other leading rubber companies have learned that improved appearance is one of the advantages of this silicone release agent. They have found that Emulsion No. 35 keeps molds cleaner longer than any other mold release agent. For that reason each molded part has a uniformly better finish whether it's the first or the last part of a production run.

In addition to lowering the cost of mold maintenance and improving the appearance of molded rubber parts, DC Mold Release Emulsion No. 35 reduces scrap to an absolute minimum. It practically eliminates fold-overs and non-knits resulting from improper lubricating. And it gives such easy release that change time is substantially reduced with very little danger of tearing heats when removing them from the cavity.

DC Mold Release Emulsion No. 35 is effective in very low concentrations and relatively few applications are required per day. The material itself is therefore comparable in price to the more conventional release agents.

DOW CORNING CORPORATION, MIDLAND, MICHIGAN

Chicago: 228 N. LaSalle Street • Cleveland: Terminal Tower
Los Angeles: 1514 S. Hope St. • New York: Empire State Building
Canada: Fiberglas Canada, Ltd., Toronto • England: Albright and Wilson, Ltd., London

FOR MORE INFORMATION ABOUT DC MOLD RELEASE EMULSION NO. 35, PHONE OUR NEAREST BRANCH OFFICE OR WRITE FOR LEAFLET NO. V 5-4.

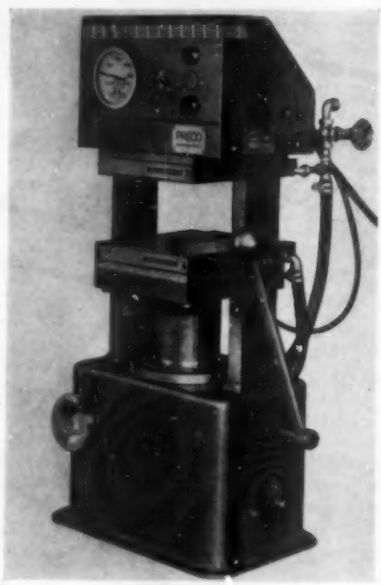
Dow Corning

FIRST IN SILICONES

NEW EQUIPMENT

Preco PA-7 Hydraulic Press

Any operation that requires pressure up to 20 tons and that may also require heat can be rapidly performed on the new Preco PA-7 Hydraulic Press, recently introduced by Preco, Inc., 1102 Architects Building, Los Angeles 13, Calif. It is a bench-type unit standing only 32 inches high. The built-in two-stage hydraulic hand



pump incorporates a high speed stroke for quick platen closure which converts semi-automatically to a high pressure stroke for easily producing the maximum force of 40,000 pounds.

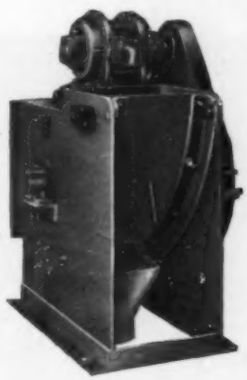
The extreme flexibility of the press makes it ideal for many types of work. It may be used individually or in batteries with the quick-acting, built-in hand pump, or connected to a central hydraulic system. Highly accurate, electrically-heated, water-cooled platens are standard equipment, but the press can be supplied with platens for heating from a central steam plant, or equipped with solid platens for "cold" work. To make it even more flexible, a third platen is installed between the two standard platens. This doubles the capacity of the press.

Platen sizes of 8 by 8 inches or 8¾ by 12 inches are available. The platens open from 0 to 8 inches and maintain alignment and an even pressure over their entire surface without adjustment.

The Burrell Technical Supply Co., Pittsburgh 19, Penn., has introduced the **Wrist-Action Shaker.** Designed for general laboratory use, the new shaker simulates the snap of the wrist, creating a swirling splash. The degree of shaking is controlled mechanically and a scale graduated from 0 to 100 makes it possible to duplicate shaking procedures.

American Dry Ice Crusher

Rubber and other manufacturers utilizing tumbling barrels employing the dry ice technique will be interested in a new dry ice crusher introduced by the American Pulverizer Co., 1536 Macklind Ave., St. Louis, Mo. Called the American Pick and Roll Dry Ice Crusher, the new device was designed to provide rapid con-



version of dry ice and is said to be a remarkable improvement over conventional methods, being faster, assuring significant savings in shrinking loss and labor, and reducing dry ice blocks to usable, uniform sizes. It will crush 200 pounds of dry ice in 15 seconds.

The unit is only 50 inches high, and can be installed in average floor-to-ceiling height. The crushing elements are manganese steel rings which apply centrifugal force at right angles to a horizontal shaft. The unit is of heavy steel plate, sectional design, welded construction, and dust-tight machine joints. Any contact with solid metal or foreign material, causes a momentary deflection of the rings, and an automatic rejection of the material from the crushing chamber into a special trap.

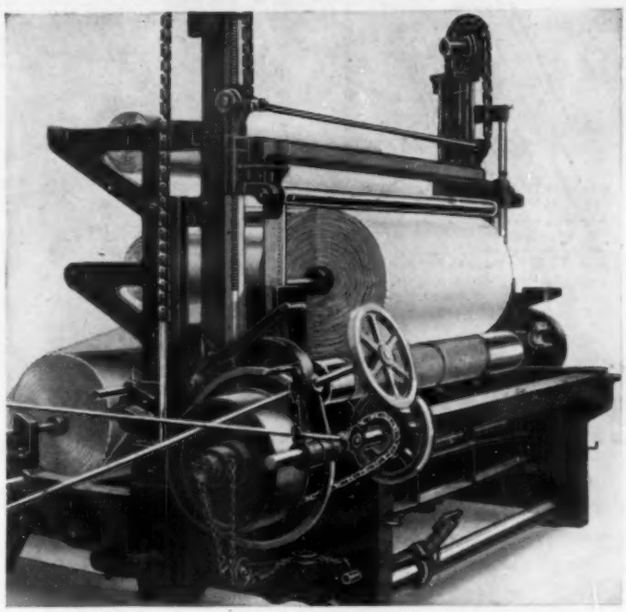
Additional features of the unit include ready access to the crushing chamber without removal of the feed chute or hopper. Specifications cover anti-friction bearings, renewable alloy steel heat-treated picks, heavy cast rotor, positive roller chain drive enclosed in oil type housing, and heavy steel adjustable platen. No shear pins, toggles, gears or other safety devices are required.

FOR HIGH ABRASION FURNACE
USE PHILBLACK O

FOR FURTHER DETAILS, SEE AD ON PAGE 604

Camachine 10-20

for men with IDEAS!



CAMACHINE 10-20 is a mighty useful machine to have in a rubber plant. It's a fast, heavy duty slitter and rollwinder, and its outstanding quality is *versatility*. The 10-20 produces top quality rewound rolls from webs of all types of plain and friction coated fabrics, paper, rubber and synthetic rubber, from thin gutta-percha tape to heavy brake lining. It can be adapted to cut and wind strip as narrow as ½". It winds tacky rolls alternately on separate rewind shafts, for positive roll separation. It inserts liner cloth in rewound rolls, or rewinds liner from the original roll. It handles web up to 72" wide, and produces top quality rewound rolls up to 36" in diameter. Obviously a machine for men with practical ideas about increased production, improved quality and lower costs. Built by

Cameron Machine Co., 61 Poplar Street, Brooklyn 2, N. Y.

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FOR FAST, TOP QUALITY ROLL PRODUCTION

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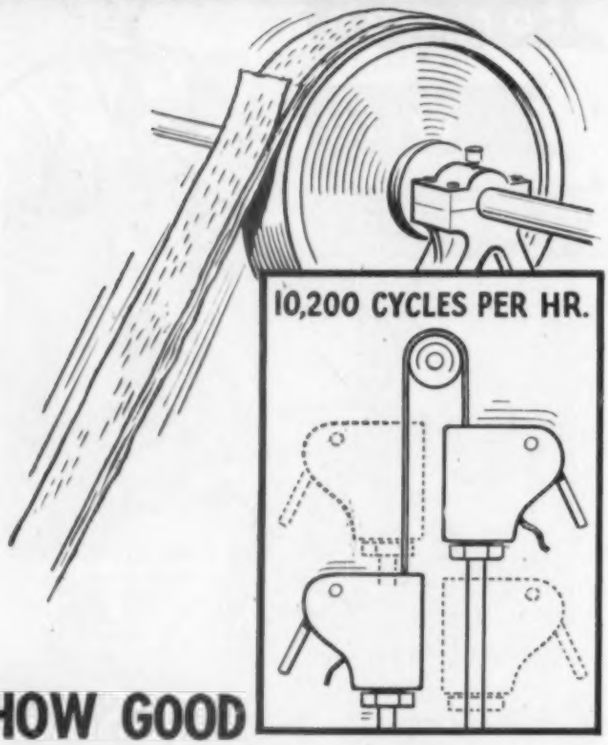

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H-P-M Hydraulic Laboratory Press

A new hydraulic laboratory press of 20 tons capacity, designed with double-acting ram providing positive pullback pressure for separating molds, dies, etc., has been developed by the Hydraulic Press Manufacturing Co., Mount Gilead, Ohio. Pressing surfaces are 8 x 9 inches, maximum opening between pressing surfaces is

14 inches, maximum travel is 8 inches, and maximum pullback pressure is 2½ tons. A manual operating valve controls the direction of travel. The press platen is traversed to the work rapidly by gravity, the hand pump being required only for building up desired pressure and returning the platen to the original open position. The press is equipped with a two-stage hand pump for rapid advance after contacting the work, and also for rapid return. The press bed is stationary, with the top platen traversing to and from the work. Attachments for tension testing, compression testing, hot plates for laminating and molding, etc., are available as optional extras.

• A new light weight but powerful aluminum **portable safety ventilator,** which has a capacity of 425 cubic feet per minute yet weighs only 50 pounds, is available from the United Electric Motor Co., 178 Centre St., New York 13, N. Y. Called "Saf-T-Air," it can be used either as blower or exhauster, and eliminates hazardous gases, fumes, vapors, dust, etc.

An improved automatic **pressure regulating valve** designed specifically for service on compressed air lines has been announced by the Hannifin Corp., 1101 So. Kilbourn Ave., Chicago 24, Ill. It is intended for use on initial, or primary, air pressure up to 150 psi and can be set to maintain reduced, or secondary, pressures ranging from 125 down to 5 psi.

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Attrition Mills

Attrition Mills for grinding all types of material. Adjustable for coarse or fine grinds. Hard iron grinding plates. Capacities to your requirements. Robinson Processing Equipment is designed by engineers whose reputation is founded upon doing things right. Literature available. Inquiries invited.

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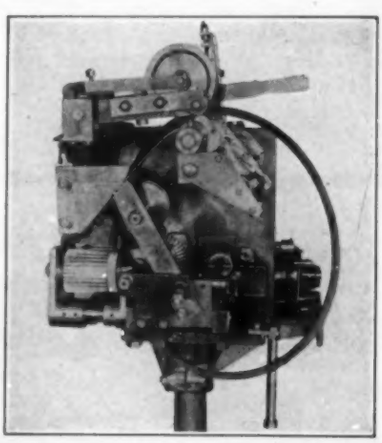

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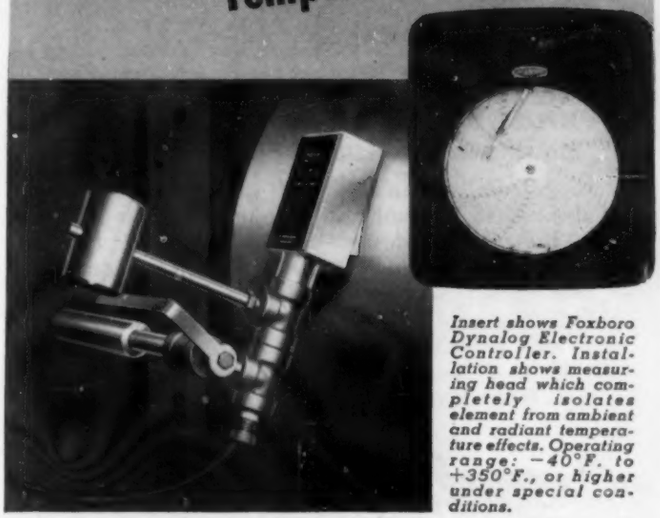
Continuous Measurement of Roll Surface Temperatures



Insert shows Foxboro Dynalog Electronic Controller. Installation shows measuring head which completely isolates element from ambient and radiant temperature effects. Operating range: −40°F. to +350°F., or higher under special conditions.

A UNIQUE, NEW FOXBORO SYSTEM
for Calender and Mill Rolls

AN ENTIRELY NEW type of measuring head coupled with the sensitive, instantly-responding Dynalog Recorder or Controller solves a tricky problem of long standing. This system is far more accurate than previous devices . . . and much simpler to use.

The Foxboro measuring element is very rugged, yet it bears so lightly (0.75 gm. per sq. cm.) that it avoids any tendency to mark or score the roll. It completely avoids errors due to friction, radiation and convection, as well as the inconveniences, so common to conventional, roll surface temperature bulbs and hand-held surface pyrometers.

Here's the ideal system for measuring or controlling surface temperatures of calender and mill rolls . . . an opportunity to save steam, reduce waste, improve product quality. Write for Bulletin 405. **The Foxboro Company, 256 Neponset Ave., Foxboro, Mass., U. S. A.**

FOXBORO *Instrumentation*
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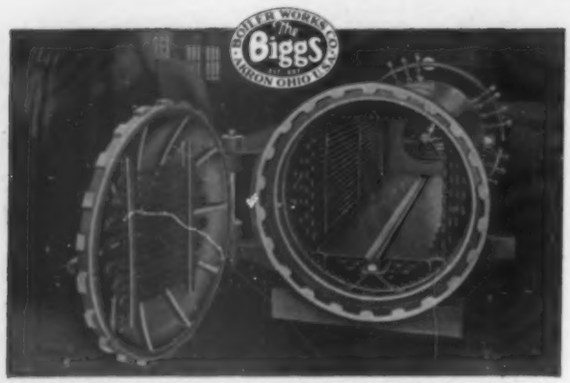

Fig. 47. Biggs vulcanizer with special heating manifolds and circulating fan; all sizes, various working pressures.

BIGGS Vulcanizers are Standard Equipment in the Rubber Industry

Biggs-built vulcanizers and devulcanizers have always had a prominent place in the development of the rubber industry. For over 47 years Biggs has furnished single-shell and jacketed vulcanizers both vertical and horizontal, as well as many different types of devulcanizers. Biggs modern all-welded units with quick-opening doors are available in all sizes for various working pressures—with many special features.

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Has many advantages in rubber stocks

- ★ Resists heat and aging.
- ★ Little tendency to revert during long cures.
- ★ Resists flex cracking.
- ★ Retains tensile strength and tear resistance at elevated temperatures.
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Designed with streamlined appearance, the new Murco Tumbling Barrel recently introduced by the D. J. Murray Manufacturing Co., Wausau, Wisconsin, is reported to have special features of direct interest to manufacturers of rubber and plastic parts on a mass production basis. Compact, the barrel is simply designed

for low maintenance. Speed changes may be made while the barrel is in motion, giving a wide range of speeds to meet various operating conditions and requirements. Specially designed dump pans are mounted on casters, and are provided with bail handles notched for crane hook. The discharge end of pan is funnel shaped, which fits in the compartment opening to facilitate loading. Separating screens of various mesh wire can be mounted in frames to fit dump pans. All moving parts such as the barrel, gears, pulleys and motor, are protected with guard rail, steel enclosures, and concealed design for safety of operation. While the frame and barrel are light weight they are designed and built to withstand heavy duty service.

FOR HIGH ABRASION FURNACE USE PHILBLACK O

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REVIEWS

BOOKLETS, CATALOGS, etc.

Summary of Technical and Patent Assets. (1948 Edition.) Phillips Petroleum Co., Bartlesville, Okla. 8½ x 11 in. 22 pp.

This book was prepared for the purpose of acquainting customers, licensees and other interested parties with a brief review of the technical and patent assets of the company. Since the book is primarily concerned with the technical progress of the company, the functions of those departments directly concerned with such technical progress are briefly outlined. An index of patents held by the organization is included, as is an index of patentees. Major subjects discussed include: Motor Fuels, Chemicals, Synthetic Rubber, Carbon Black, Lubricants, Catalysts and Catalyst Regeneration, Exploration and Well Logging, Oil and Gas Production, Liquefied Petroleum Gas, and Instrumentation and Apparatus. A brief description of the Philblack process, including a simplified flow diagram, is part of the section on carbon black.

•

Longer Service from Off-the-Highway Tires. Rubber Manufacturers Association, 444 Madison Ave., New York 22, N. Y. 8½ x 11 in. 48 pp.

With the growth in size of off-the-highway equipment, stronger and longer-wearing tires have been developed. This pamphlet outlines the methods by which the user of off-the-road equipment can get the best results from his tires. Such matters as over-loading, correct pressures, maintenance and examination, mounting, etc., are discussed. Drawings and photographs illustrate the different points made in the pamphlet. Load and inflation tables, and general data tables on loads, pressures, tire and rim sizes are included.

•

Horses to Horsepower. By Franklin M. Reck. Automobile Manufacturers Association. New Center Bldg., Detroit 2, Mich. 8½ x 11 in. 48 pp.

This study evaluates the role of the truck and highway in our transportation pattern. The history of the motor truck is traced, from its first uses to the multiple uses for heavy vehicles today. The place of the truck within the general pattern of the nation's economy is emphasized, with various sections devoted to the use of the truck on farms, in cities and in industry. The pamphlet contains many photographs showing trucks at work in many different fields and localities. A bibliography of source materials is included.

•

Reinforcing Furnace Blacks. (Technical Service Report R-5). Witco Chemical Co., 295 Madison Ave., New York 17, N. Y. 8½ x 11 in. 7 pp.

In this report, four standard grades of furnace and channel blacks and three new reinforcing furnace blacks are compared with a material under development by the Continental Carbon Co., currently designated as Experimental Black 13-J. Results with both natural rubber and GR-S stocks, with 50 and 80 parts loading, are given, the data covering tensile, modulus, elongation, hardness, tear, and rebound. Stocks containing the new experimental black are reported to show up favorably.

•

Tonox in Tires and Footwear. (Compounding Research Report No. 6). Naugatuck Chemical Division of U. S. Rubber Co., 1230 Ave. of the Americas, New York 20, N. Y. 8½ x 11 in. 8 pp.

The use of Tonox, a mild antioxidant, in natural rubber tires, in footwear, and in heavy-duty natural rubber tread stocks is discussed in this technical report, with physical test results reported for typical stocks. General recommendations for the use of the material are included in the report.

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A PORTABLE machine capable of stripping slab rubber up to 1″ thick at the rate of 20,000 feet in 8 hours. Any width desired.

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- Has micro-adjustment for accurate widths.
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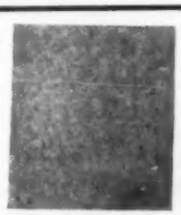

STABELAN after 1100 hrs. UV exposure. RESULT—retains flexibility with only slight change and discoloration.

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Comparison of STABELAN

with other commonly used stabilizers in Vinyl Films exposed in Miami, Florida . . . South Florida Testing Service.

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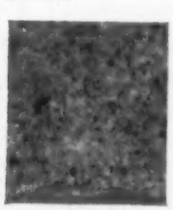

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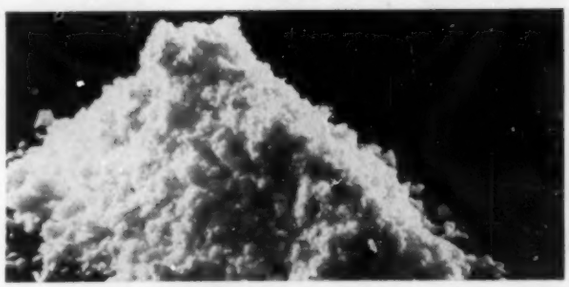

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of our industrial study, "Opportunities in New Orleans for Manufacturers of Rubber Products". Address: Dept. 35B, Greater New Orleans, Inc., 1024 Maison Blanche Bldg., New Orleans 16.

GREATER NEW ORLEANS

REVIEWS (CONT'D)

Dispersoid Analyses of Hevea Latex. By J. H. E. Hessels. Rubber Foundation, Delft, Holland. 6½ x 9 in. 16 pp.

Issued as Communication Rubberinstitute T.N.O. No. 8, this report describes two methods used for the purpose of determining the weight distribution curve of the rubber particles in Hevea latex according to their diameter. The methods used were a photomicrographic dispersoid analysis and a sedimentation analysis. The latter method, with the help of a modified pipette method, was found to be very suitable for the purpose, and the author was able to determine the weigh distribution curve of latex to a diameter of about 0.4 μ within a creaming time of 10 to 14 days. The report originally appeared in the October-November, 1946, issue of "Recueil des Travaux Chimiques des Pays-Bas."

•

Rayon Mile by Mile. Industrial Rayon Corp., 500 Fifth Ave., New York 18, N. Y. 8½ x 11 in. 24 pp.

This booklet depicts the various steps in the continuous process manufacture of yarn in photos and flow charts, and includes textile and tire production scenes. Specific functions performed by thread advancing reels during the various stages of continuous process production are matched to the comparable steps in conventional discontinuous package processing in the center spread of the booklet, which unfolds to present the 19-foot over-all height of the continuous process machine in proper perspective.

•

Celatom. Celatom Products Department, Eagle-Picher Co., Cincinnati 1, Ohio. 8½ x 11 in. 24 pp.

An explanation of Celatom, described as a superior diatomaceous silica for use as an industrial aid, and its applications in the rubber and other industries is contained in this new booklet. The characteristics of the material, its source, its preparation, and its specific applications are all discussed. Celatom's light weight, high bulk, good color, heat resistance, flexibility and elasticity are said to make it ideal as an inert filler and extender in rubber compounds.

•

Witco at Work with Industry. Witco Chemical Co., 295 Madison Ave., New York 17, N. Y. 11 x 8 in. 24 pp.

The products and services offered by Witco to the chemical field are outlined in this new brochure. It represents a behind-the-scenes inspection of the company's broad, yet specialized facilities as indicated by its nine manufacturing plants and four laboratories. Among the products covered are carbon black, asphalt, stearates and rubber chemicals. A complete list of the products offered by the company is included.

•

Mechanical Handling. (Bulletin No. 120) John Waldron Corp., New Brunswick, New Jersey. 8½ x 11 in. 16 pp.

General information concerning the mechanical handling of paper, cloth, artificial leather, transparents and other materials that are to be processed in web form is provided in this technical bulletin. Fully illustrated, the bulletin contains references to the many different factors involved, such as equipment for unroll, tension control, converting, festooning, conveying, guide winding and others.

•

Olsen Stiffness Testers. (Bulletin No. 35.) Tinius Olsen Testing Machines Co., 500 N. 12th St., Philadelphia 23, Penna. 8½ x 11 in. 16 pp.

Descriptions of the company's complete line of stiffness testing machines available in 1, 6 and 50 inch-pound moment capacities are contained in this bulletin. Factual data is given on the various types of tests and applications made possible by the use of these machines together with procedure for production and research testing, explanatory charts and useful formulae.

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Hand Grip Rubber Gauge No. 3-B

Height	.....9"	Length	....9¾"	Range	.....½"
Depth of Throat	...6½"	Dial 50 Divisions Each Div. 1/1000"		Weight	....4 lbs.
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REVIEWS (CONT'D)

Shawinigan Acetylene Black. Shawinigan Chemicals, Ltd., P. O. Box 6072, Montreal, Canada. 8½ x 11 in. 64 pp.

The history, development, properties and applications of the company's acetylene black are covered in this comprehensive booklet. Comparison of natural rubber stocks containing both Shawinigan and "conductive" blacks is made, as is one of GR-S stocks containing both Shawinigan and EPC blacks, with the results of high temperature and aging experiments given in all instances. Data on the use of the company's black in butyl rubber is also included. Special sections are devoted to hot flow in butyl rubber, thermal conductivity in rubbers, and the cement technique. Miscellaneous applications of the black are also discussed in the booklet.

•

Determination of Hardness by Means of the Rex Hardness Gauge. (Compounding Research Report No. 7). Naugatuck Chemical Division of U. S. Rubber Co., 1230 Ave. of the Americas, New York 20, N. Y. 8½ x 11 in. 8 pp.

The application and advantages of the Rex Hardness Gauge are covered in this report, with sections devoted to proper operation, reading of the scale, accuracy of the gauge, and cleaning methods. A comprehensive description of the gauge, written by the inventor, John G. Zuber, is also included. The Rex instrument is about the size of a large fountain pen, weighs about 1½ ounces, can easily be carried in the vest pocket.

•

Witco Pigments in Rubber (Bulletin No. 47-1). Witco Chemical Co., 295 Madison Ave., New York 17, N. Y. 8½ x 11 in. 36 pp.

The numerous carbon blacks and inorganic pigments offered by the company to the rubber and allied industries are covered in this attractive two-colored booklet. The physical properties of these blacks and pigments are listed, and their behavior in rubber stocks discussed. Comparison is made of various carbon blacks in both straight natural rubber and in a blend of 70 natural-30 GR-S. Several calcium carbonate pigments are also compared both with other inorganic pigments and with carbon blacks.

•

Organic Nitrogen Compounds. Carbide and Carbon Chemicals Corp., 30 East 42nd St., New York 17, N. Y. 8 x 11 in. 32 pp.

One of a series of publications issued by Carbide and Carbon to describe chemicals in the important aliphatic groups, this booklet presents the latest data on more than thirty nitrogen compounds featured by the company. Properties and applications are given in each instance for these compounds which are useful in emulsifying, neutralizing, synthesizing, dissolving and saponifying methods. A list of references to the amines in the technical literature is included in the booklet.

•

An Evaluation of Resin 510 in Buna N Molding and Calendering Compounds. By L. J. Radi. R-B-H Dispersions Division of Interchemical Corp., Bound Brook, N. J. 8½ x 11 in. 4 pp.

As indicated by its title, this report evaluates the usefulness of R-B-H Resin 10 in improving the properties of various types of nitrile rubber. Work is reported on Hycar OR-15, Perbunan 26, and Chemigum I. Although the final test results were basically the same for all three of these rubbers, it was found that the resin had to be added to each rubber differently. Properties of the original vulcanizates as well as of aged samples are shown.

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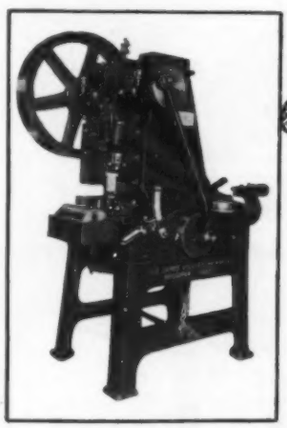
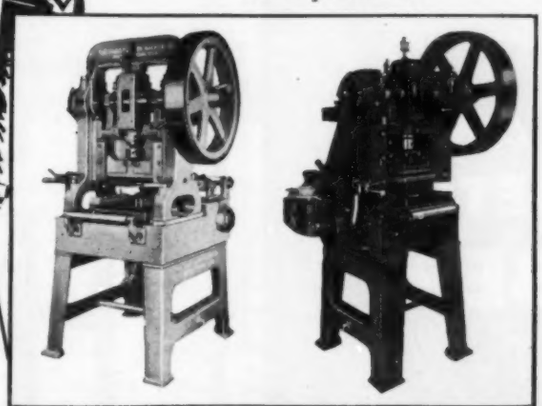
COULTER
RUBBER CUTTING MACHINES

NEW Proven features for continuous volumetric control and stripping for HEELS-SOLES-TAPS and other molded products.



MODEL A-1



MODEL A-2 MODEL A-3

- Model A-1 For HEELS at high speed production, or short runs.
- Model A-2 For Multiple HEELS, HALF and FULL SOLES with stock grain.
- Model A-2S (Not Illustrated) For cutting crosswise of grain of stock.
- Model A-3 For Multiple HEELS and TAPS with or across stock grain.

Here is the *Rubber Cutting Machine* that will *cut with* or across the stock grain, either singular or in multiples—from a strip of stock direct from the warming mill.

WRITE FOR FULL PARTICULARS

Production Machines
Since 1896

The James **COULTER** *Machine Co.*
BRIDGEPORT • CONNECTICUT • U.S.A.

RPA NO. 3

RUBBER PEPTIZING AGENT

by

DU PONT

★ Shortens Breakdown Time

★ Reduces Breakdown Cost

★ Increases Capacity of Processing Equipment

★ Improves Processing Quality of Rubber Stocks

DU PONT RUBBER CHEMICALS

E. I. DU PONT DE NEMOURS & CO. (INC.)

WILMINGTON 98, DELAWARE

BETTER THINGS FOR BETTER LIVING ...THROUGH CHEMISTRY

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CRUDE AND SYNTHETIC RUBBER

The Meyer & Brown Corp.

Founded 1894

347 Madison Avenue, New York 17, N. Y.

Thiokol Liquid Polymer LP-2. Thiokol Corporation, 780 No. Clinton Ave., Trenton 7, N. J. 9 x 12 in. 24 pp.

The general properties of Thiokol LP-2, a polymer manufactured in a liquid state which can be converted by suitable catalysts to a tough rubber without appreciable shrinkage, are outlined in this bulletin. Vulcanization of the polymer with various curing agents, including lead peroxide, is described, and a discussion of suitable extenders and modifiers is included. One section of the bulletin is devoted to the numerous applications for Thiokol LP-2, including adhesives, protective coatings, printer's rolls, gaskets and joint sealers.

•

Nylon Textile Fibres in Industry. Nylon Division, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Delaware. 6 x 9 in. 30 pp.

The industrial applications of nylon are enumerated in this booklet, including those in the automotive, aircraft, marine and laundry fields. Among applications discussed are those in tires, tire cord, wing covers, de-icers and collapsible fuel cells. Sections are devoted to the specific properties of nylon, including strength, light weight, toughness, abrasion resistance, elasticity, low moisture absorption, and resistance to light, chemicals and heat. The non-inflammability and non-toxicity of the material are also discussed.

•

What Makes a Plant Fire-Safe? Associated Factory Mutual Fire Insurance Companies, 184 High St., Boston 10, Mass. 8½ x 11 in. 16 pp.

The essential points for management to have in mind in planning or supervising plant fire-safety are outlined in this booklet. Each page deals with a separate feature of the overall problem. The broad principles governing construction standards, automatic sprinklers, water supplies, and extinguishers are covered as well as the essential requirements of a good watch service and fire fighting organization. Included is a breakdown of industrial fire causes and suggestions for their elimination.

•

Micromax Model C Indicating Controllers. (Catalog No. ND-44-3.) Leeds & Northrup Co., 4907 Stenton Ave., Philadelphia 44, Penna. 7½ x 10½ in. 8 pp.

Designed to provide instrument men with a complete yet compact guide to the company's Model C Micromax Controllers, this catalog lists all these instruments under one cover for the first time. Complete specifications for all Model C controllers are listed in easy-to-use, tabular form. Illustrations depicting actual installations are included. The standard ranges for which these controllers can be supplied are given.

FOR HIGH ABRASION FURNACE USE PHILBLACK O

FOR FURTHER DETAILS, SEE AD ON PAGE 604

REVERTEX
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NORMAL LATEX

NATURAL LATEX COMPOUNDS

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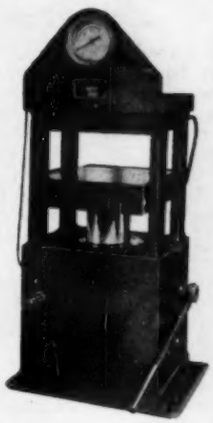
HOT PLATE MOLDING PRESS
Engineered for Rubber and Plastics

- **Low Cost Operation**
- **Self-Contained**
- **Sturdily Built**
- **Prompt Delivery**



The M & N 30 ton electric hot plate molding press is specially designed for the rubber and plastics industries where speed and ease of operation are essential to low cost production. It is readily adapted for production runs or laboratory control work.

Available with any number of openings. Steam heated platens available at slight extra cost. Larger platens and motor-driven hydraulic power units are also available. Features of this M & N press include the visual temperature indicator, dual pressure hand pump, electrically heated and thermostatically controlled platens, all steel construction, and large platen areas.

SPECIFICATIONS

SIZE OF BASE	16" x 12"	DAYLIGHT OPENING	10"
OVERALL HEIGHT	42"	STROKE	6"
PLATEN SIZE	12" x 12"	RAM DIAMETER	5"
CAPACITY	30 tons	APPROX. WEIGHT	400 lbs.

HYDRAULICS DIVISION

M & N MACHINE TOOL WORKS, Inc.
148 Orono Street — Clifton, N. J.

Crystex

INSOLUBLE SULPHUR

Stauffer CHEMICALS SINCE 1885

CRYSTEX (Insoluble Sulphur) preserves tack in uncured natural rubber and synthetic stocks. It does not bloom, and is especially useful in tire carcass stocks, and in camel back. Improved cures may be expected when CRYSTEX replaces ordinary sulphur in some compounds. CRYSTEX has been found useful in some cements, and in compounding latices for dipping baths.

Commercial Rubbermakers' Sulphur, Tire Brand, 99½% Pure—Refined Rubbermakers' Sulphur, Tube Brand, 100% Pure—Carbon Tetrachloride—Carbon Bisulphide—Caustic Soda—Sulphur Chloride.

STAUFFER CHEMICAL CO.

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221 North LaSalle Street, Chicago 1, Illinois
424 Ohio Bldg., Akron 8, Ohio—Apopka, Fla.
555 South Flower Street, Los Angeles 13, Cal.
636 California Street, San Francisco 8, Cal.
North Portland, Oregon—Houston 2, Texas

MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, MAR. 10, 1948

Natural Rubber

The price of spot rubber on the Commodity Exchange has moved in the rather narrow range of 1.12 cents since our last report (February 10), high being 20.62 cents on February 19 and low 19.50 cents on February 26. The same low of 19.50 cents was again reached today (March 10). The average price of spot rubber for the month of February was 20.42 cents, based on 18 trading days.

The trend toward lower prices was attributed largely to continued reports of the slowing down in the production of rubber goods. Especially is this true of tire production, with some plants, like that of the Norwalk Tire & Rubber Co., shutting down for a week or more, and the announcement of substantial lay-offs by Goodyear in Akron. Based on overall business conditions, rubber manufacturers are said to be looking for 18-cent rubber.

The Commodity Exchange reported on February 14 that consumption of natural rubber in the United States in 1947 amounted to 562,698 long tons and synthetic rubber to 558,566 long tons. Consumption in January, 1948, was estimated by the R.M.A. at 100,358 long tons (57,440 natural, 42,918 synthetic). Shipments from Malaya of natural rubber during February were reported at 72,912 tons, a drop of 10,600 tons from the January shipments of 83,512 tons.

Today's quotations in the outside market, London and Sinagpore, follow:

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.19½
June	.19⅛
July-September	.18⅜
Thin Latex Crepe:	
Spot	.24
April-June	.23¾
Thin Brown Crepe, No. 2	.16¼
Ambers, No. 3	.16¼
Flat Bark Crepe	.12¾

London Market

(Standard Smoked Sheets)

April-June	19.62 - 19.73
July-September	19.20 - 19.41

Singapore Market

(Standard Smoked Sheets)

April	18.20 - 18.31

Synthetic Rubber

(Dry Types)

Butaprene NXM	.470 - .495
Chemigum 30 N4NS	.400 - .470
Chemigum 50 N4NS	.400 - .470
Chemigum N3	.450 - .520
Hycar OR-25	.400 - .425
Hycar OR-15	.470 - .495
Hycar OS-10	.400 - .425
Neoprene Type E	—— - .650
Neoprene Types CG and AC	—— - .500
Neoprene Types FR and KNR	—— - .750
Neoprene Type S	—— - .320
Neoprene Type NC	—— - .250
Perbunan 18	.390 - .415
Perbunan 26	.400 - .425
Perbunan 35	.470 - .495
Thiokol Type A	.370 - .470
Thiokol Type ST	.750 - .850
Thiokol Type FA	.520 - .620
Thiokol PR-1	.750 - .850

Scrap Rubber

Demand for scrap has quieted down again, although improved weather conditions have enabled some delayed shipments to be made. Reclaimers seem to have adopted a watch-and-wait attitude, which seems typical of the entire rubber field at the moment. There have been no changes in the price structure since our last report. Current quotations follow:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$12.00
Beadless truck tires	ton	nom.
Mixed truck tires	ton	nom.
Beadless passenger tires	ton	nom.
No. 1 passenger peelings	ton	42.50
No. 1 truck peelings	ton	42.50
Red passenger tubes	lb.	.06
Black passenger tubes	lb.	.04
Mixed passenger tubes	lb.	.04
No. 2 truck tubes	lb.	nom.
Red truck tubes	lb.	nom.
Black truck tubes	lb.	.04
Buffings	ton	15.00

Reclaimed Rubber

General reduction in tire production has made itself felt in a lessening of the demand for reclaimed rubber in some quarters. Curtailment of automobile production has also been a contributing factor in this respect. OMD has reported that consumption of reclaim in 1947 reached 288,395 long tons, as compared with 275,410 long tons in 1946. No changes have been made in the price structure since our last report. Current quotations follow:

Tires				
Black, Acid	lb.	.08¼	@	.09¼
Black, Digester	lb.	.08	@	.08½
Peels	lb.	.09	@	.09½
GR-S Whole Tire	lb.	.08½	@	.09
Inner Tubes				
Black	lb.	.12¾	@	.13¼
Red	lb.	.13½	@	.14
GR-S	lb.	.09½	@	.10
Butyl	lb.	.08½	@	.09
Shoe				
Unwashed	lb.	.08¼	@	.08¾

Cotton Tire Fabrics

Following the trend of decreased tire production, the demand for cotton tire and chafer fabrics has waned in recent weeks, and few manufacturers have contracted beyond May delivery. In an effort to stimulate interest some fabric manufacturers have dropped chafer prices by 2 cents a pound. There has been no change in the tire fabric price structure. Current quotations follow:

Standard, Peeler, 12/4/2	lb.	.7600
Standard, Peeler, 14/4/2	lb.	.7800
Standard, Peeler, 16/4/3	lb.	.8050
Extra Staple, Peeler, 12/4/2	lb.	.8575
Extra Staple, Peeler, 14/4/2	lb.	.8775
Extra Staple, Peeler, 16/4/3	lb.	.9025

Chafers

14.4 oz. (per sq. yard)	lb.	.7550
9.25 oz. (per sq. yard)	lb.	.7125
11.65 oz. (per sq. yard)	lb.	.6850
8.9 oz. (per sq. yard)	lb.	.7275

Cotton

The price of middling uplands on the Cotton Exchange has swung in a range of 2.72 cents since our last report (February 10), high for the period being 35.35 cents on March 5 and low 32.63 cents on February 11. The average price of middling uplands for the month of February was 33.63 cents, based on 22 trading days. This compares with an average of 36.09 cents for the month of January.

Washington sources stated that the Army and private banks involved in the Japanese buying program have reached agreement on all phases of the proposed credit plan, but that approval by the Export-Import Bank and the National Advisory Council on Foreign Economic Affairs is still needed.

Despite the light number of covering sales that news of the agreement between two of three principal groups involved brought, observers were not optimistic over early completion of consideration by the two agencies still to be heard from.

Until something of a really definite nature in regard to both Japanese buying and ERP is known, most analysts believe the current wait-and-see market will continue. Outside factors, such as another break in the commodity markets, would affect cotton values, but these quarters point out that there is no strong factor, either upscale or downscale, on the immediate horizon for cotton other than the foreign demand.

Quotations for middling uplands on the Exchange follow:

	Feb. 10	March 10		
	Close	High	Low	Close
March	31.93	33.75	33.44	33.67
July	31.44	33.08	32.68	32.88
October	29.25	30.14	29.85	29.96

Closing Rubber Prices on New York Commodity Exchange

FROM FEBRUARY 11 TO MARCH 10

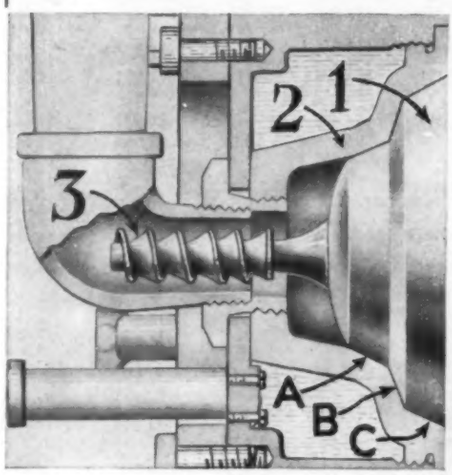
Date	Spot	Mar.	May	July	Sept.	Sales
Feb.						
11	20.37	20.10	19.60	19.15	18.55	160
12	——	——	——	——	——	——
13	20.50	20.25	19.65	19.05	18.60	108
14	——	——	——	——	——	——
15	——	——	——	——	——	——
16	20.50	20.10	19.51	19.00	18.40	57
17	20.00	19.50	18.76	18.05	17.45	288
18	20.00	19.90	19.07	18.30	17.70	272
19	20.62	20.40	19.65	19.05	18.57	213
20	20.50	20.06	19.55	18.55	18.40	160
21	——	——	——	——	——	——
22	——	——	——	——	——	——
23	——	——	——	——	——	——
24	20.25	19.90	19.23	18.35	17.90	198
25	19.62	19.30	18.66	17.87	17.56	182
26	19.50	19.10	18.53	17.83	17.50	207
27	19.62	19.35	18.70	18.05	17.65	32
28	——	——	——	——	——	——
29	——	——	——	——	——	——
Mar.						
1	20.00	19.80	19.29	18.60	18.25	167
2	20.12	20.00	19.36	18.72	18.40	107
3	20.12	19.70	19.25	18.55	18.24	85
4	19.75	19.40	19.00	18.33	17.98	63
5	20.00	20.00	19.40	18.88	18.50	40
6	——	——	——	——	——	——
7	——	——	——	——	——	——
8	20.12	19.85	19.55	18.95	18.52	145
9	19.75	19.50	19.20	18.60	18.15	110
10	19.50	19.20	18.95	18.39	17.95	137

Greatly Improve the Quality and Texture of Your Product

The TRI-HOMO Homogenizer is the **only** unit built that gives TRIPLE dispersion in ONE operation.

Pigment dispersion or any product that requires complete dispersion, whether homogenizing, emulsifying or grinding in processing, will be greatly improved in quality and texture by this highly efficient unit.

The cross-sectional view shows the multiple angles, A, B, and C of the ROTOR (1), and STATOR (2). This patented feature of triple angles produces the TRIPLE dispersion in ONE operation. (3) is the worm impeller that assures constant feed.



The TRI-HOMO Homogenizer is of heavy-duty construction, easy to operate, easy to regulate and easy to clean.

MAKES A GOOD PRODUCT BETTER

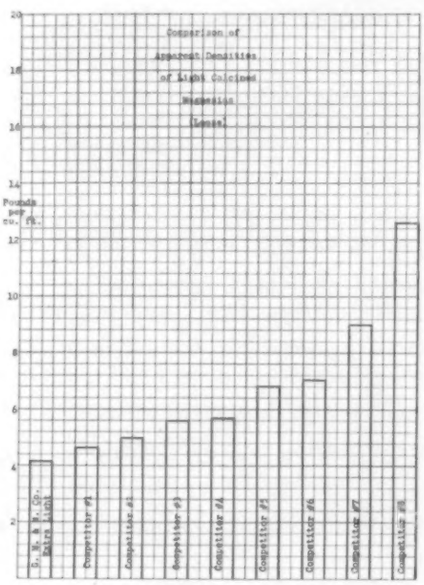
Laboratory, Medium and Large Production Sizes Available.

Fully Illustrated Catalog and Prices Sent on Request.

TRI-HOMO CORPORATION

Plant and Offices SALEM, MASSACHUSETTS

HOW LIGHT IS YOUR "LIGHT" MAGNESIA OXIDE?



Naturally you want the lightest magnesia oxide for natural and synthetic rubber stocks. It means better dispersion of the magnesia.

This chart shows how General Magnesite's magnesia compares with the products of its six nearest competitors.

When you want the **lightest** calcined magnesia, use General Magnesite's.

We'll be glad to send samples, prices, and technical bulletin #47-3 with all the facts.

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Specialist in Magnesia

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STATISTICS *Of Interest to the Rubber Industry*

U. S. Imports and Re-Exports of Natural Rubber

	GROSS IMPORTS												
	Natural Rubber (Dry)			Natural Rubber (Latex)			Guayule				RE-EXPORTS		TOTAL NET IMPORTS
Year	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Total Gross Imports Long Tons	Long Tons	Total Declared Value	Long Tons
1936	467,064	152,072,496	14.54	19,852	6,659,899	14.98	1,229	286,552	10.41	488,145	12,581	4,488,223	475,564
1937	574,600	237,307,041	18.44	23,185	10,213,670	19.67	2,694	745,873	12.36	600,479	7,902	3,385,433	592,577
1938	397,620	125,357,730	14.07	11,878	4,147,318	15.59	2,485	623,819	11.21	411,983	5,652	1,799,124	406,331
1939	469,803	167,558,245	15.92	27,438	10,467,552	17.03	2,232	463,345	9.27	499,473	13,125	5,832,618	486,348
1940	780,820	303,117,726	17.33	33,789	14,593,466	19.28	3,634	758,007	9.31	818,243	7,060	3,197,136	811,183
1941	989,329	401,890,393	18.14	34,798	15,965,627	20.48	4,881	1,145,767	10.48	1,029,008	5,376	2,757,872	1,023,632
1942	265,980	112,377,896	18.86	10,646	5,630,667	23.61	5,523	1,660,792	13.42	282,149	10,856	5,913,386	271,293
1943	50,348	31,364,033	27.81	1,890	1,312,202	30.99	7,679	3,636,789	21.14	59,917	22,587	16,446,707	37,330
1944	103,820	73,908,389	31.78	3,091	2,092,211	30.22	6,700	3,351,233	22.33	113,611	9,739	8,712,695	103,872
1945	134,454	95,850,441	31.82	4,773	3,115,853	29.14	10,040	5,963,797	26.52	149,267	9,509	7,201,746	139,758
1946	366,415	222,552,939	27.12	8,421	5,843,085	30.98	5,344	2,859,246	23.89	380,180	7,711	5,331,954	372,469
1946:													
Mar.	31,093	22,520,391	32.33	504	328,905	29.15	160	87,344	24.34	31,757	714	488,044	31,043
Apr.	26,234	18,997,757	32.33	1,001	808,463	36.06	874	467,151	23.86	28,109	392	243,952	27,717
May	4,784	3,314,818	30.93	1,052	687,100	29.11	430	219,830	22.82	6,266	422	419,278	5,844
June	8,518	6,132,895	32.15	561	366,165	29.15	466	244,580	23.41	9,545	460	446,253	9,085
July	20,641	13,947,817	30.17	696	451,523	28.96	291	148,442	22.85	21,628	2,457	1,600,600	19,171
Aug.	34,125	18,656,966	24.41	1,231	803,435	29.14	366	193,680	23.06	35,722	1,515	902,005	34,207
Sept.	41,311	22,317,275	24.12	.....	.....	...	425	219,849	23.09	.....	145	81,481	.....
Oct.	45,523	24,745,403	24.27	672	438,938	29.15	691	377,319	24.38	46,886	649	613,424	46,237
Nov.	58,756	30,648,620	23.29	130	85,363	29.24	379	200,270	23.58	59,265	60	29,800	59,205
Dec.	44,159	23,810,760	23.87	2,005	1,501,336	33.43	494	265,679	24.02	46,658	17	20,625	46,641
1947:													
Jan.	92,459	51,035,472	24.64	.....	.....	....	315	169,081	23.65	.....	20	16,644	.....
Feb.	57,771	30,580,942	23.63	2,426	1,550,499	28.52	481	256,760	23.84	60,678	1,991	1,149,953	58,687
Mar.	35,128	19,421,550	24.46	496	324,103	29.15	463	246,573	23.76	36,087	39	23,592	36,048
Apr.	45,453	23,627,600	23.21	34	26,754	34.84	524	282,941	24.09	46,011	26	20,725	45,985
May	91,918	47,208,658	22.93	763	442,050	25.87	345	186,201	24.11	93,026	14	9,169	93,012
June	62,346	28,339,739	20.29	2,825	1,642,417	25.95	554	298,705	24.07	65,725	47	22,998	65,678
July	56,080	22,379,698	17.08	1,407	855,454	25.09	74	27,458	16.55	57,561	421	226,777	57,140
Aug.	43,637	16,127,766	16.93	1,784	960,877	24.48	104	24,768	18.54	45,525	191	118,666	45,334
Sept.	45,724	14,589,611	14.24	516	324,206	27.12	44	10,414	15.29	46,284	174	95,640	46,110
Oct.	46,898	14,819,306	13.11	3,081	1,370,242	19.85	....	.....	....	49,979	134	164,620	49,665
Nov.	48,952	16,962,935	15.46	1,994	1,042,644	23.13	....	.....	....	50,946	514	289,752	50,432
Dec.	69,158	24,458,323	15.21	2,438	1,280,834	23.45	....	.....	....	71,596	...	.....	71,596

Source: U. S. Department of Commerce.
Notes: (1) Figures for latex are on a dry weight basis. (2) Figures for re-exports include natural rubber (dry and latex) and guayule.

Natural Rubber
(Including Latex and Guayule)
(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1936	488,145	575,000	12,581	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1946:				
May	6,126	17,867	327	170,763
June	23,382	16,466	911	176,768
July	14,942	21,998	222	169,490
Aug.	45,087	28,405	592	185,580
Sept.	46,122	31,123	988	199,591
Oct.	36,735	35,421	106	200,799
Nov.	55,231	37,323	35	218,672
Dec.	57,620	38,802	23	237,467
1947:				
Jan.	102,080	45,328	43	294,191
Feb.	30,318	40,983	1,253	283,479
Mar.	40,437	43,104	509	280,812
Apr.	55,976	43,818	0	292,970
May	42,738	43,018	0	330,960
June	57,055	42,529	311	345,175
July	57,243	40,389	421	131,624
Aug.	44,672	47,289	191	130,040
Sept.	46,241	50,557	174	122,097
Oct.	49,340	57,286	314	114,115
Nov.	50,840	52,076	514	110,752
Dec.	71,414	56,284	371	129,038
1948:				
Jan.	80,628	58,065	334	136,281

Source: 1936-40, U. S. Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.

U.S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.
(All Quantities in Long Tons)

	Balata		Jelutong		Gutta-Percha & Other Guttas	
Year	Tons	Value	Tons	Value	Tons	Value
1936	535	199,368	6,163	1,296,364	1,568	555,643
1937	354	151,344	7,109	2,017,786	1,122	440,894
1938	509	181,140	9,132	2,944,504	444	204,582
1939	694	265,553	6,640	1,603,418	1,740	539,255
1940	648	300,500	7,451	2,449,137	2,340	1,004,885
1941	924	489,514	8,821	2,954,001	1,783	607,025
1942	1,544	1,107,059	1,200	530,296	804	525,763
1943	1,047	708,701	35	14,840	....	.....
1944	1,012	660,805	88	45,578	10	4,999
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1946:						
Jan.	129	121,228	....	.....	....	.....
Feb.	38	35,699	....	.....	5	2,178
Mar.	100	70,315	....	.....	....	.....
Apr.	362	261,098	....	.....	....	.....
May	325	212,899	....	.....	....	.....
June	80	80,006	....	.....	....	.....
July	219	178,564	115	91,412	7	19,839
Aug.	234	249,380	....	.....	4	13,438
Sept.	159	161,937	4	9,337	23	47,147
Oct.	282	367,393	21	29,307	305	216,901
Nov.	152	270,379	28	39,502	3	10,233
Dec.	199	287,167	57	41,757	26	52,096
1947:						
Jan.	183	252,580	37	29,087	36	71,252
Feb.	270	300,828	36	44,629	17	39,679
Mar.	137	158,530	190	112,132	21	28,898
Apr.	85	106,783	178	86,923	31	48,178
May	212	208,440	524	259,745	86	164,611
June	76	63,612	83	37,314	47	88,420
July	19	24,444	287	122,677	22	50,204
Aug.	151	159,338	143	78,357	19	46,667
Sept.	86	120,633	408	192,352	18	120,633
Oct.	210	389,245	352	187,255	35	88,776
Nov.	290	302,164	148	106,443	15	53,202
Dec.	172	189,934	412	240,023	42	77,371

Source: U. S. Department of Commerce.

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Synthetic Rubber—Totals

(GR-S, Neoprene, Butyl, and Buna N Types)

(All Quantities in Long Tons)

Year	Production	Imports	Consumption	Exports	Stocks On Hand at End of Period
1941	8,383	.....	6,259	572	1,702
1942	22,434	.....	17,651	1,419	4,612
1943	231,722	.....	170,891	18,148	41,568
1944	762,630	11,043	566,670	104,266	142,927
1945	820,373	10,407	693,580	83,778	203,454
1946	740,026	7,709	761,699*	72,920	114,963
1947	508,702	1,093	559,566	11,383	62,366
1946:					
Oct.	62,086	1,149	60,729	474	110,913
Nov.	60,305	894	57,794	1,781	113,556
Dec.	62,648	902	53,453	1,857	114,963
1947:					
Jan.	62,103	0	58,764	3,359	115,655
Feb.	59,125	0	53,321	2,166	119,912
Mar.	57,478	0	55,514	704	121,322
Apr.	50,117	4	54,333	357	116,829
May	39,069	0	48,692	433	105,291
June	35,681	0	42,580	2,286	97,612
July	31,917	0	37,607	412	97,728
Aug.	32,901	0	39,001	585	91,288
Sept.	30,518	0	41,865	343	79,246
Oct.	33,834	0	45,668	194	67,379
Nov.	37,825	634	39,091	188	67,871
Dec.	38,134	455	43,230	358	62,366
1948:					
Jan.	39,428	893	43,022	416	60,078

Source: Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures shown include the output of both government and privately-owned plants. (3) Figures for 1941 are estimated. * Includes year-end adjustment of 5,384 tons to cover non-reporting companies.

Synthetic Rubber–By Type

(All Quantities in Long Tons)

New Supply

	GR-S (Buna S)	GR-M (Neoprene)	GR-I (Butyl)	Buna N Types	Total
1942	3,721	8,956	23	9,734	22,434
1943	182,259	33,603	1,373	14,487	231,722
1944	679,949	56,660	20,252	16,812	773,673
1945	724,859	45,672	52,378	7,871	830,780
1946	613,408	47,766	80,823	5,738	747,735
1947	408,858	31,495	68,824	6,618	515,795

Consumption

1942	2,579	6,833	22	8,217	17,651
1943	131,977	26,205	304	12,405	170,891
1944	495,552	46,243	10,763	14,112	566,670
1945	600,145	42,394	43,012	8,029	693,580
1946	632,126	44,357	79,228	5,988	761,699
1947	448,589	37,703	68,838	4,536	559,666

Exports

1942	222	1,037	....	160	1,419
1943	14,937	2,540	40	631	18,148
1944	98,380	4,799	530	557	104,266
1945	76,555	5,837	980	406	83,778
1946	68,763	2,642	495	1,020	72,920
1947	7,951	2,617	62	755	11,385

Stocks at End of Period

1942	1,050	1,786	4	1,772	4,612
1943	30,975	6,415	1,035	3,143	41,568
1944	116,130	11,739	9,892	5,166	142,927
1945	170,571	9,703	18,378	4,802	203,454
1946	81,483	10,470	19,478	3,532	114,963
1947	40,606	5,237	13,184	3,339	62,366

Source: Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures for GR-M and Buna N Types include production of privately-owned plants.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1940	1941	1942	1943	1944	1945	1946	1947
Jan.	40,370	46,190	49,216	36,085	47,540	52,008	51,186	57,119
Feb.	37,557	42,782	42,666	36,274	47,754	48,856	47,889	50,551
Mar.	44,607	49,572	50,820	41,586	52,263	55,364	56,801	59,947
Apr.	47,683	55,879	49,554	48,177	50,005	59,024	62,045	64,140
May	52,946	60,121	53,212	49,828	54,230	60,748	66,774	70,865
June	55,459	59,062	50,077	52,325	54,266	60,580	63,221	71,329
July	53,865	63,906	54,606	49,867	55,119	66,170	69,044	73,441
Aug.	55,346	63,575	48,793	51,880	55,618	70,058	66,701	72,089
Sept.	52,297	59,768	50,093	49,707	56,318	64,529	62,216	71,384
Oct.	53,807	58,412	50,094	53,111	53,154	55,708	66,598	73,277
Nov.	49,074	54,670	50,729	50,703	54,967	53,543	61,315	64,158
Dec.	46,413	53,568	39,250	48,695	52,250	49,745	61,043	67,285
Total	589,424	667,505	589,110	568,238	633,482	696,333	734,833	795,535

Source: U. S. Bureau of Mines.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	Production	Consumption Tons	Consumption % to Crude [a]	Exports	Stocks On Hand at End of Period
1936	150,571	141,486	24.6	7,085	19,000
1937	185,033	162,000	29.8	13,233	28,800
1938	122,400	120,800	27.6	7,403	23,000
1939	186,000	170,000	28.7	12,611	25,250
1940	208,971	190,244	29.3	11,347	32,636
1941	274,202	251,231	32.2	13,851	41,750
1942	286,007[b]	254,820	64.6	30,405	42,532
1943	304,058[c]	291,082	59.6	15,678	46,201
1944	260,631[d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1946:					
June	24,882	21,725	27.4	1,416	35,295
July	22,619	21,350	27.9	961	35,603
Aug.	25,798	24,566	27.3	1,093	35,742
Sept.	23,956	23,715	26.4	579	35,404
Oct.	26,322	26,706	27.7	759	34,261
Nov.	24,748	24,385	25.6	1,108	33,516
Dec.	25,254	23,597	25.6	1,507	33,666
1947:					
Jan.	25,545	27,715	26.6	1,443	30,053
Feb.	23,990	25,484	27.3	1,142	27,417
Mar.	26,209	26,157	26.8	1,268	31,940
Apr.	26,696	25,066	25.5	1,073	33,527
May	25,408	21,908	23.1	1,271	37,145
June	24,144	21,283	25.0	1,200	39,598
July	21,252	20,433	26.8	1,052	39,704
Aug.	21,658	21,093	24.4	1,414	40,130
Sept.	22,561	23,801	25.6	902	38,461
Oct.	25,648	26,735	26.3	1,016	36,643
Nov.	23,145	23,425	25.7	1,339	36,347
Dec.	25,123	25,229	25.4	1,437	35,943
1948:					
Jan.	25,634	25,539	25.3	768	35,551

Source: 1936-40, Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. [a] Includes natural and synthetic rubber. [b] Includes 893 tons of imports. [c] Includes 67 tons of imports. [d] Includes 21 tons of imports.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1930	2,784,745	571,241	3,355,986	1939	2,866,796	704,308	3,571,104
1931	1,973,090	416,648	2,389,738	1940	3,692,328	721,637	4,413,965
1932	1,135,491	235,187	1,370,678	1941	3,744,500	875,381	4,619,681
1933	1,573,512	346,545	1,920,057	1942	220,814	133,083	353,897
1934	2,177,919	575,192	2,753,111	1943	0	4,501	4,501
1935	3,252,244	694,690	3,946,934	1944	0	124,819	124,819
1936	3,669,528	781,862	4,451,390	1945	83,792	313,643	397,435
1937	3,915,889	892,382	4,808,271	1946	2,148,699	930,760	3,079,459
1938	2,000,985	485,852	2,486,837	1947	3,558,178	1,220,634	4,778,812
1947:							
Jan.	246,605	99,818	346,423	July	279,631	97,814	377,445
Feb.	267,015	105,042	372,057	Aug.	261,158	86,509	347,667
Mar.	301,525	118,234	419,759	Sept.	307,942	110,720	418,662
Apr.	314,765	106,984	421,749	Oct.	315,969	118,365	434,334
May	284,357	96,430	380,787	Nov.	305,148	87,611	392,759
June	307,124	91,810	398,934	Dec.	366,939	101,569	468,508
1948:							
Jan.	226,695	77,434	304,129	July	.....	.....	.....
Feb.	.....	.....	.....	Aug.	.....	.....	.....
Mar.	.....	.....	.....	Sept.	.....	.....	.....
Apr.	.....	.....	.....	Oct.	.....	.....	.....
May	.....	.....	.....	Nov.	.....	.....	.....
June	.....	.....	.....	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.

Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Rim Production

	1943	1944	1945	1946	1947
Passenger Car	780,291	1,748,917	4,504,368	15,058,469	21,346,004
Truck & Bus	4,949,004	6,391,441	6,486,652	5,939,244	7,737,353
Agricultural	301,997	997,301	1,441,909	1,735,992	2,633,699
Earth Mover	945	703	1,308	5,520	10,610
Total	6,032,237	9,138,362	12,434,237	22,739,225	31,727,666

	1947 Oct.	1947 Nov.	1947 Dec.	1948 Jan.	1948 Feb.	1948 Mar.
Passenger Car	2,225,026	1,771,961	1,967,503	2,032,210	.....	.....
Truck & Bus	725,182	521,230	651,273	584,095	.....	.....
Agricultural	236,717	228,308	266,690	231,049	.....	.....
Earth Mover	1,730	1,210	586	1,710	.....	.....
Total	3,188,655	2,522,709	2,886,052	2,849,064	.....	.....

Source: The Tire & Rim Association, Inc.

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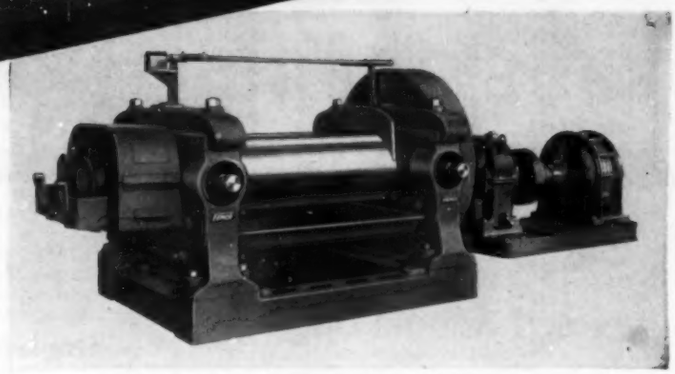

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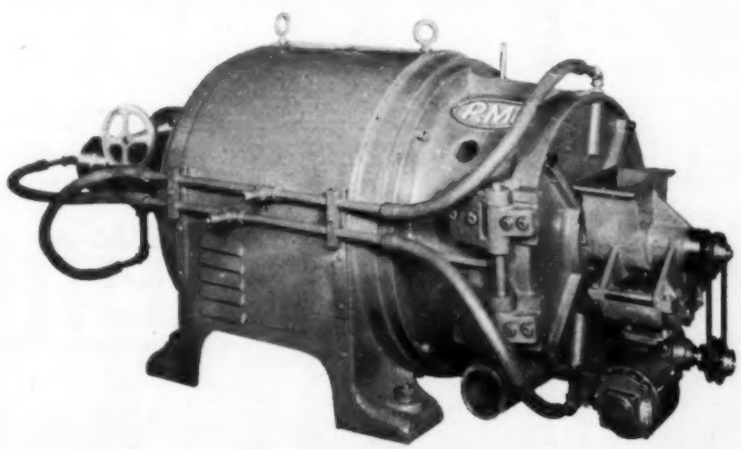

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- Capacity 400 to 800 lbs. per hour.

This new design incorporates every improvement suggested by years of specialized experience in building scrap rubber grinding machinery exclusively

Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1935 (total)	19,263	29,406	1,514	50,183	49,362	8,196
Passenger Car.	17,063	26,036	948	44,047	43,256	7,054
Truck and Bus	2,200	3,370	566	6,136	6,106	1,142
1936 (total)	21,446	30,866	1,073	53,385	56,041	10,717
Passenger Car.	18,941	26,999	644	46,584	49,013	9,291
Truck and Bus	2,505	3,867	429	6,801	7,028	1,426
1937 (total)	22,353	29,886	1,246	53,485	53,310	10,383
Passenger Car.	20,055	26,177	696	46,928	46,497	8,745
Truck and Bus	2,298	3,709	550	6,557	6,813	1,638
1938 (total)	11,516	30,567	1,049	43,132	40,907	8,451
Passenger Car.	10,086	27,104	580	37,770	35,789	6,937
Truck and Bus	1,430	3,463	469	5,362	5,118	1,514
1939 (total)	18,208	38,022	1,279	57,509	57,613	8,665
Passenger Car.	15,742	33,471	607	49,820	49,933	7,108
Truck and Bus	2,466	4,551	672	7,689	7,680	1,557
1940 (total)	22,252	35,346	1,176	58,774	59,186	9,127
Passenger Car.	19,560	30,903	411	50,874	50,965	7,270
Truck and Bus	2,692	4,443	765	7,900	8,221	1,857
1941 (total)	24,780	39,895	1,489	66,164	61,540	4,436
Passenger Car.	19,855	34,119	586	54,560	50,392	3,165
Truck and Bus	4,925	5,776	903	11,604	11,148	1,271
1942 (total)	6,680	8,872	207	15,759	15,351	6,247
Passenger Car.	910	2,734	38	3,682	2,790	4,432
Truck and Bus	5,770	6,138	169	12,077	12,561	1,815
1943 (total)	6,128	18,547	225	24,900	20,423	1,883
Passenger Car.	82	10,606	71	10,759	7,620	1,132
Truck and Bus	6,046	7,941	154	14,141	12,803	751
1944 (total)	6,654	26,439	263	33,356	33,446	2,013
Passenger Car.	208	18,330	130	18,668	18,819	1,218
Truck and Bus	6,446	8,109	133	14,688	14,627	795
1945 (total)	5,984	36,479	504	42,967	44,524	3,077
Passenger Car.	1,115	25,463	222	26,800	28,200	2,214
Truck and Bus	4,869	11,016	282	16,167	16,324	863
1946 (total)	15,310	65,490	1,512	82,312	82,298	2,448
Passenger Car.	11,086	54,684	653	66,423	66,466	1,763
Truck and Bus	4,224	10,806	859	15,889	15,832	685
1947 (total)	25,055	62,890	3,249	91,194	95,548	6,975
Passenger Car.	19,644	52,865	1,608	74,117	77,790	5,470
Truck and Bus	5,411	10,025	1,642	17,077	17,758	1,505
1947:						
Oct. (total)	2,178	6,134	327	8,639	8,889	5,513
Passenger Car.	1,732	5,094	188	7,014	7,365	4,109
Truck and Bus	446	1,040	139	1,625	1,524	1,405
Nov. (total)	2,097	5,603	215	7,915	7,716	5,277
Passenger Car.	1,712	4,595	106	6,413	6,383	4,012
Truck and Bus	385	1,008	109	1,502	1,333	1,265
Dec. (total)	2,338	4,029	216	6,583	8,050	6,975
Passenger Car.	1,915	3,326	91	5,336	6,622	5,470
Truck and Bus	419	703	125	1,246	1,427	1,505

Source: The Rubber Manufacturers Association, Inc.

Cotton, Rayon and Nylon Tire Fabrics

(Production in Thousands of Pounds)

	Cotton				Rayon and Nylon [b]		
	Tire Cord Not Woven	Cord Fabric Woven	Chafer and All Other Tire Fabrics	Total	Tire Cord Not Woven	Tire Cord And Other Tire Fabrics	Total
1944:							
Jan.-Mar.	17,135	42,783	11,452	71,370	1,812	15,830	17,642
Apr.-June	17,587	40,580	11,499	69,666	1,353	19,586	20,939
July-Sept.	16,653	38,462	11,055	66,170	1,299	25,915	27,214
Oct.-Dec.	12,982	34,107	10,948	58,037	2,773	33,630	36,403
Total	64,357	155,932	44,954	265,243	7,237	94,961	102,198
1945:							
Jan.-Mar.	16,671	43,835	12,306	72,812	3,726	37,777	41,503
Apr.-June	16,044	42,383	13,604	72,031	4,064	42,476	46,540
July-Sept.	15,136	38,158	14,122	67,416	3,549	42,606	46,155
Oct.-Dec.	15,514	36,442	13,573	65,529	a	47,734	47,734
Total	63,365	160,818	53,605	277,788	11,339	170,593	181,932
1946:							
Jan.-Mar.	17,128	39,377	15,245	71,750	a	51,208	51,208
Apr.-June	19,622	40,197	18,623	78,442	a	52,511	52,511
July-Sept.	17,279	39,259	18,787	75,325	5,102	46,932	52,034
Oct.-Dec.	20,660	42,668	21,708	85,036	5,858	50,589	56,447
Total	74,689	161,501	74,363	310,553	10,960	201,240	212,200
1947:							
Jan.-Mar.	21,972	49,377	21,815	93,164	5,322	52,059	57,381
Apr.-June	23,491	53,746	16,480	93,717	5,486	47,360	52,846
July-Sept.	15,571	43,914	14,596	74,081	6,161	46,753	52,914
Oct.-Dec.	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....

Source: U. S. Bureau of the Census.

Notes: (a) Included with tire cord and fabrics to avoid disclosures of operations of individual mills. (b) Fuel cell fabrics are not included with rayon and nylon tire cord and fabrics.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1936	21,514	32,188	721	54,423	57,036	10,945
1937	22,464	29,554	749	52,767	52,373	10,312
1938	11,515	28,134	644	40,293	37,848	8,166
1939	18,190	31,998	1,002	51,190	50,649	7,036
1940	22,172	29,070	972	52,214	52,237	7,017
1941	24,722	33,749	1,232	59,703	57,433	4,686
1942	n.a.	n.a.	n.a.	13,958	12,568	5,742
1943	6,183	12,373	176	18,732	15,260	2,584
1944	6,461	19,739	190	26,390	26,750	2,823
1945	6,119	33,161	408	39,688	41,102	3,671
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,039	49,107	2,496	76,641	75,509	8,089
1947:						
May	1,980	3,268	323	5,571	5,752	9,772
June	2,154	3,364	260	5,779	5,440	9,252
July	1,970	4,051	196	6,216	4,542	7,909
Aug.	1,792	4,509	197	6,499	5,179	6,937
Sept.	2,119	4,930	184	7,233	6,550	6,339
Oct.	2,187	5,278	150	7,616	7,619	6,424
Nov.	2,092	4,124	126	6,343	6,456	6,682
Dec.	2,334	2,873	117	5,324	6,544	8,089

Source: The Rubber Manufacturers Association, Inc.
n.a.—Not available.

Smoked Sheets—Spot Closing Prices

(New York Market—Cents per pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1910	288	141	206.60	1929	26⅞	15½	20.55
1911	184	114	141.30	1930	16½	7½	11.98
1912	140	108	121.60	1931	8⅜	4¼	6.17
1913	113	59	82.04	1932	4¾	2½	3.49
1914	93	56	65.33	1933	9⅞	2⅜	5.96
1915	79	58½	65.85	1934	15⅜	8¾	12.92
1916	102	55	72.50	1935	13¾	10½	12.37
1917	90	52	72.23	1936	23	13½	16.41
1918	70	40	60.15	1937	26⅛	14	19.39
1919	57	38½	48.70	1938	17⅞	10¾	14.64
1920	56½	16	36.30	1939	24	14⅜	17.57
1921	21¾	11½	16.36	1940	24	18¼	20.10
1922	28⅜	13⅜	17.50	1941	24⅜	19½	22.40
1923	37⅛	24¾	29.45	1942	22½	22½	22.50
1924	40⅛	17⅜	26.20	1943	22½	22½	22.50
1925	121	34⅜	72.46	1944	22½	22½	22.50
1926	88½	36¾	48.50	1945	22½	22½	22.50
1927	41¾	33	37.72	1946	22½	22½	22.50
1928	41¾	17	22.48	1947	25	14	20.00

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1941	1942	1943	1944	1945	1946	1947	1948
Jan.	10.66	19.85	21.34	20.76	22.36	25.49	32.58	36.09
Feb.	10.87	20.05	21.61	21.34	22.29	26.57	33.91	33.63
Mar.	11.08	20.42	21.98	21.65	22.43	27.52	35.89	....
Apr.	11.48	21.10	22.02	21.71	21.88	28.40	35.89	....
May	12.97	20.88	21.97	21.63	23.30	28.17	36.51	....
June	14.66	19.78	21.92	22.31	23.42	29.89	37.83	....
July	16.55	20.27	21.46	22.33	23.27	34.11	38.03	....
Aug.	17.06	19.45	21.09	22.11	23.10	36.31	34.83	....
Sept.	17.94	19.62	21.10	22.10	23.25	37.59	32.21	....
Oct.	17.31	19.79	21.00	22.32	23.85	36.79	32.39	....
Nov.	17.21	20.21	20.32	22.13	24.71	31.50	34.50	....
Dec.	18.09	20.55	20.32	22.28	25.21	33.03	36.74	....
Average for Year	14.66	20.16	21.34	21.89	23.25	31.28	35.11	....

Consumption of Vinyl Resins

(In Thousands of Pounds)

	Sheeting and Film [a]	Textile and Paper Coating Resins [b]	Molding and Extrusion Materials [b]	All Other [b, c]
1946	52,080	11,673	61,852	27,083
1947:				
Jan.	6,197	1,237	6,802	3,097
Feb.	5,131	892	5,345	2,255
Mar.	5,853	1,142	6,922	3,081
Apr.	5,981	1,425	6,890	2,021
May	4,431	1,432	5,777	1,486
June	3,915	1,084	4,937	1,611
July	3,722	1,537	4,567	1,747
Aug.	4,105	1,650	4,826	2,336
Sept.	5,790	1,194	5,788	2,354
Oct.	5,965	1,781	7,671	2,623
Nov.	7,246	1,680	5,760	2,155
Dec.	8,094	2,183	7,829	2,298

Source: Bureau of the Census.

Notes: (a) Includes weight of fillers, plasticizers, extenders and safety glass sheeting; (b) Resin content; (c) Includes Adhesives, but excludes data for protective coating resins.

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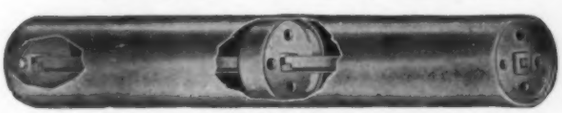

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Rubber Industry Employment, Payrolls, Wages and Hours

Employment — Thousands of Production Workers and Index (1939 = 100)

Month	1946 All Rubber Products Number	1946 All Rubber Products Index	1946 Rubber Tires & Tubes Number	1946 Rubber Tires & Tubes Index	1947 All Rubber Products Number	1947 All Rubber Products Index	1947 Rubber Tires & Tubes Number	1947 Rubber Tires & Tubes Index
Jan.	209	172.7	99	182.4	240	198.8	110	235.5
Feb.	214	177.1	101	187.3	240	198.2	109	233.3
Mar.	220	181.5	104	191.6	238	196.5	108	231.4
Apr.	217	179.1	104	192.8	234	193.5	106	227.0
May	217	179.7	105	193.4	223	184.5	102	220.0
June	221	182.9	106	195.8	219	180.7	118	217.0
July	214	177.0	99	183.1	212	175.2	115	212.3
Aug.	223	184.0	103	189.9	215	177.8	117	214.9
Sept.	229	189.1	107	197.0	215	178.1	113	207.5
Oct.	236	194.8	110	204.0	220	182.0	114	211.0
Nov.	240	198.8	112	207.0	224	185.2	115	212.2
Dec.	242	200.1	112	206.3	224	185.6	...	....

Payrolls — Production Workers Pay Rolls Unadjusted Index (1939 = 100)

Month	1945 All Rubber Products	1945 Rubber Tires & Tubes	1946 All Rubber Products	1946 Rubber Tires & Tubes	1947 All Rubber Products	1947 Rubber Tires & Tubes
Jan.	323.2	342.4	290.1	272.6	386.3	416.3
Feb.	323.6	339.8	292.1	271.9	385.0	413.3
Mar.	315.4	301.9	298.2	281.1	374.3	397.3
Apr.	315.9	306.0	319.7	312.9	383.9	414.2
May	299.8	288.6	322.1	314.2	367.2	399.3
June	304.3	293.8	331.4	318.3	361.9	396.1
July	298.7	286.8	321.4	304.3	352.7	389.5
Aug.	231.3	211.4	336.9	311.2	357.4	396.0
Sept.	231.3	211.4	363.9	348.9	369.0	397.9
Oct.	254.2	239.8	361.3	346.1	375.6	398.0
Nov.	257.8	240.2	377.4	360.3	383.3	407.5
Dec.	275.5	256.7	392.2	368.9	....	....

Wages — Average Weekly Earnings

Month	1945 All Rubber Products	1945 Rubber Tires & Tubes	1946 All Rubber Products	1946 Rubber Tires & Tubes	1947 All Rubber Products	1947 Rubber Tires & Tubes
Jan.	$54.49	$64.29	$46.71	$50.29	$54.03	$59.78
Feb.	54.40	64.04	46.05	49.21	54.06	59.90
Mar.	50.62	57.29	46.46	49.72	52.97	58.05
Apr.	51.93	59.75	49.67	54.77	55.23	61.64
May	50.09	57.32	49.82	54.72	55.30	61.12
June	51.45	59.20	50.45	54.82	55.49	61.35
July	51.81	59.59	50.60	56.11	55.74	62.06
Aug.	46.76	52.81	51.03	55.42	55.92	61.15
Sept.	47.20	53.59	53.69	59.89	57.76	64.75
Oct.	45 57	49.48	51.74	57.38	57.55	63.78
Nov.	44.68	47.78	52.93	58.87	57.95	64.86
Dec.	45.48	48.54	54.63	60.46	....	....

Wages — Average Hourly Earnings

Month	1945 All Rubber Products	1945 Rubber Tires & Tubes	1946 All Rubber Products	1946 Rubber Tires & Tubes	1947 All Rubber Products	1947 Rubber Tires & Tubes
Jan.	$1.151	$1.317	$1.121	$1.255	$1.330	$1.511
Feb.	1.149	1.314	1.129	1.266	1.331	1.517
Mar.	1.117	1.260	1.138	1.275	1.330	1.512
Apr.	1.136	1.294	1.232	1.414	1.397	1.608
May	1.132	1.284	1.266	1.446	1.416	1.622
June	1.140	1.307	1.283	1.461	1.419	1.615
July	1.138	1.296	1.292	1.472	1.445	1.640
Aug.	1.119	1.269	1.295	1.474	1.445	1.640
Sept.	1.098	1.243	1.323	1.507	1.447	1.661
Oct.	1.100	1.231	1.313	1.492	1.436	1.644
Nov.	1.112	1.249	1.322	1.503	1.453	1.661
Dec.	1.113	1.247	1.331	1.513	....	....

Hours — Average Weekly Hours per Worker

Month	1945	1946	1947	Month	1945	1946	1947
January	47.3	41.7	40.6	July	45.5	39.2	38.6
February	47.3	40.8	40.6	August	41.8	39.4	38.7
March	45.3	40.8	39.8	September	43.0	40.6	39.9
April	45.7	40.3	39.5	October	41.4	39.4	40.1
May	44.2	39.4	39.0	November	40.2	40.1	39.9
June	45.2	39.3	39.1	December	40.9	41.2	...

Source: U. S. Department of Commerce.

Indexes of Production, Shipments and Inventory For The Rubber Industry

Production 1935-1939 = 100 (Based on man-hours)

Month	1945	1946	1947	Month	1945	1946	1947
Jan.	247	215	247	July	218	211	207
Feb.	247	216	246	Aug.	193	221	210
Mar.	236	221	239	Sept.	172	234	217
Apr.	233	219	234	Oct.	191	234	223
May	224	215	220	Nov.	192	243	226
June	222	218	216	Dec.	205	252	226

Shipments—Average Month 1939 = 100 (Based on $ Value)

Jan.	311	229	290	July	274	268	289
Feb.	351	242	315	Aug.	255	282	300
Mar.	351	260	322	Sept.	200	311	336
Apr.	356	282	311	Oct.	260	333	338
May	333	288	300	Nov.	212	313	...
June	333	293	312	Dec.	292	352	...

Inventory — Average Month 1939 = 100 (Based on $ Value)

Jan.	170.6	173.7	238.0	July	183.3	195.0	272
Feb.	176.7	179.9	250.0	Aug.	182.4	198.0	262
Mar.	175.5	186.4	262.0	Sept.	177.4	204.0	251
Apr.	175.3	198.5	273.0	Oct.	167.7	212.0	251
May	178.3	195.5	282.0	Nov.	167.1	215.0	....
June	178.7	192.4	281.0	Dec.	169.0	216.0	....

Source: U. S. Department of Commerce.

Various Compounding Materials Consumed by the Rubber Industry

Material	1940	1941	1942	1943	1944	1945	1946
Asphalt [a]							
Short tons	22,772	20,536	22,263	16,510	20,189	19,483	28,715
% of total	0.9	0.6	0.6	0.5	0.6	0.5	0.7
Barite (Barytes):							
Short tons	4,283	9,800	6,334	8,000	10,000	10,000	20,000
% of total	2.3	4.2	3.6	3.9	2.9	2.1	4.4
Carbon Black:							
Short tons	155,090	219,751	147,974	236,737	369,015	402,193	470,732
% of total	58.5	68.2	65.8	75.2	78.7	78.9	74.1
Clay, Kaolin:							
Short tons	92,640	127,055	51,334	50,964	59,588	109,936	162,393
% of total	11.1	11.6	5.1	5.5	6.8	11.7	12.3
Clay, Fire & Stoneware:							
Short tons	10,104	9,000	5,000	10,259	7,160	7,800	12,951
% of total	0.4	0.2	0.1	0.2	0.1	0.1	0.2
Lead Sulfate, Basic:							
Short tons	128	200	89	131	268	200	....*
% of total	2.1	1.9	1.1	2.3	4.2	5.2	.....
Lime:							
Short tons	1,879	3,058	1,381	2,039	5,634	7,170	3,193
% of total	0.03	0.05	0.02	0.05	0.13	0.10	0.1
Litharge:							
Short tons	1,590	3,968	3,460	4,302	3,023	1,864	2,131
% of total	1.8	3.3	3.8	3.8	2.2	1.3	1.6
Lithopone:							
Short tons	3,387	3,547	1,047	1,078	726	977	1,607
% of total	2.2	2.0	0.8	0.8	0.5	0.7	1.1
Mica, Ground:							
Short tons	1,731	3,476	1,754	3,063	1,137	3,715	4,951
% of total	6.2	8.0	3.7	6.0	2.2	7.0	8.0
Sulfur:							
Short tons	54,000	63,000	40,000	51,000	63,000	64,960	72,800
% of total	2.5	2.4	1.4	1.8	1.9	2.0	2.2
Talc [b]							
Short tons	28,501	58,114	40,487	48,994	51,833	63,758*	65,980
% of total	10.0	13.9	10.0	11.8	13.0	16.0	14.4
Zinc Oxide:							
Short tons	70,979	90,429	52,717	67,898	59,518	63,447	83,776
% of total	62.8	63.4	53.0	47.4	42.3	49.6	53.1

([b]) Includes pyrophyllite and ground soapstone. * Revised.

Source: U. S. Bureau of Mines.

Notes: (*) Solid and semi-solid products of less than 200 penetration.

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FACTORY MANAGER, thirty years' experience, desires connection with small or medium size plant. Broad experience in compounding, milling, calendering, extruding and molding all types of rubber, including sponge. Capable of mold, die, and machine designing, cost estimating, and have numerous trade contacts. Eastern location preferred. Address Box 2696, RUBBER AGE.

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FACTORY SUPERINTENDENT for medium sized mechanical rubber goods plant capable of taking complete charge of operations. Must be familiar with compounding, extruding, molding, and trimming operations. Should have thorough knewledge of molding design and factory routine. Chemical background very desirable but not necessary. State age, education, and experience. Salary commensurate with experience and ability. Address Box 2678, RUBBER AGE.

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By manufacturers in Chile, Chemical Engineer with expert knowledge and experience in the manufacture of rubber flooring and tiles, and with general experience in the production of other rubber goods, such as hose, rubber-soled shoes and belting, but excluding bicycle tires and tubes.
Engineer must be capable of taking charge and developing the industry, especially in the floor tile and belting departments.
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CHEMIST, CHEMICAL ENGINEER: With wide experience in compounding for calendered unsupported vinyl film, knowledge of processing equipment and laboratory testing procedure. In reply state age, salary expected, and details of experience and education. Address Box 2683, RUBBER AGE.

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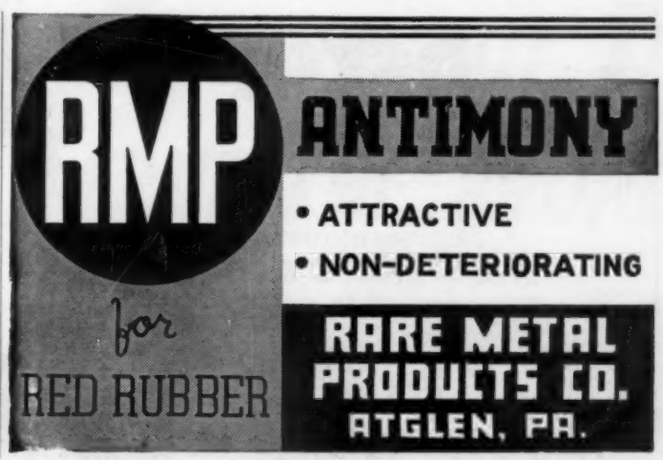

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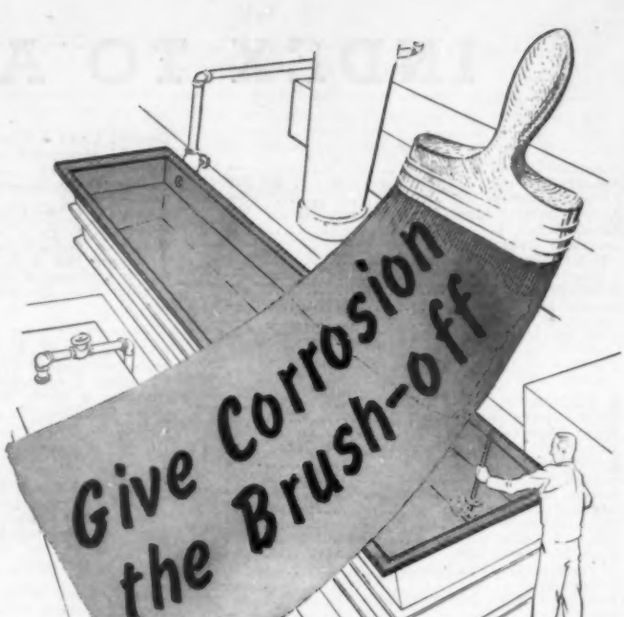

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